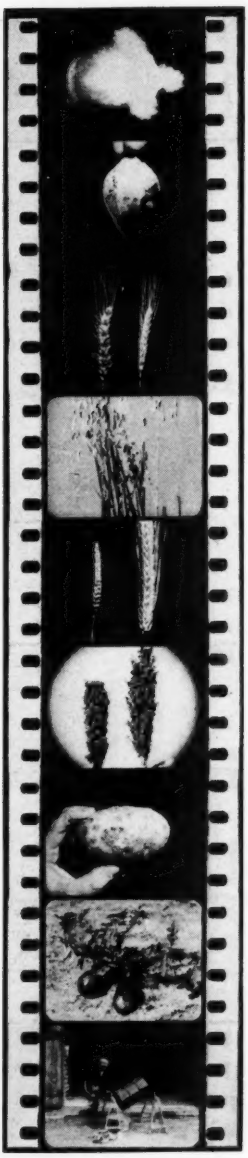
Better Crops WITH PLANT FOOD

Feb.-Mar. 1932 10 Cents

Spring Fertilizer Number

Educational Motion Pictures



on Seed-borne Diseases— Available for Your Use

The increasing economic importance of seed-borne plant diseases in relation to farm profits emphasizes the need of acquainting both students in agriculture and practical farmers with the disease symptoms on various crops; the losses caused by such diseases; the methods of combating them; and the profits to be obtained by controlling or eliminating them.

To meet this need we have prepared five two-reel motion picture films, one each on the following crops: Cereals, Corn, Cotton, Potatoes and Vegetables; also a one-reel picture on the Brown-Patch diseases of grass turf.

These pictures are educational in scope. They point out the tremendous losses caused by seed-borne diseases; show the typical appearance on the plant of many important surface seed-borne diseases; picture the effects of diseases on germination, stands and yields; and illustrate easy, quick methods for controlling such diseases.

Of special interest are the scenes of Gibberella developing on a kernel of corn; plants actually growing from treated and untreated diseased seed; marketing of smutty wheat, including inspection and dockage; the life history of smut; the 1930 national corn husking contest; the county agent's service to the grower; illustrations of the results of Agricultural Experiment Stations' tests in combating seed-borne diseases, including comparative yields from treated and untreated seed.

These films are available for use in your classes, at Farmers' week or for farm meetings. They are lent to you free of all charges. Write us for description of films and complete details on the condition for borrowing these films.

THE BAYER-SEMESAN COMPANY, INC.

Dept. 144-A **105 HUDSON STREET, NEW YORK, N. Y.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XVII NUMBER SIX

TABLE OF CONTENTS, FEB.-MAR., 1932

Fertility 3
Jeff Compares Men and Soils

The Use of Potash Aids 5
In Reducing the Ravages of Diseases and in Producing Quality Crops, C. B. Williams

Complete Fertilizers for Orchards 9
An Apple Story, by T. H. Blow

Potato Profits in Arkansas 12
A. G. Thomas Describes Some Experiments

The Inquiring Mind and the Seeing Eye 14
Dr. A. S. Alexander Pays Tribute to James Wilson

Fertilizing Lespedeza 17
A New Crop Needs Plant Food, by W. L. Myers

Magnesium 18
Is Necessary to Potato Production, by Jos. A. Chucka

Tomatoes in the Northern Neck of Virginia 21
A Profitable Industry, Described by L. B. Dietrick

Common Sense About Cotton 23
A Timely Discussion, by J. N. Harper

South Carolina Produces High Quality Asparagus 24
But Yields Are Too Low, by J. L. Baskin

Kainit Controls Weeds 27
According to Paul A. Fisher's Experience

The Use of Potash in Indiana 28
S. D. Conner Gives the Why, When, and Where

Spending for Profits 30
R. E. Stephenson Answers Timely Questions

Agricultural and Scientific Bureau

N. V. POTASH EXPORT MY., INC.

of Amsterdam, Holland

Directors: J. N. HARPER G. J. CALLISTER

THE FIRST SIGNS OF SPRING

Better Crops with PLANT FOOD

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VOL. XVII NEW YORK, FEB.-MAR., 1932 No. 6

Jeff Compares Men and Soils in—

Fertility

By Jeff McDermid

AN able bodied man with a spade can turn more ground in a day than a paralytic with a tractor gang plow. But a barren dune of drift sand will not produce the fiftieth part of what the same area properly supplied with organic matter and balanced fertility can supply.

Now put the able bodied man on the drift sand with his spade, and his day of furrow turning will be for naught, and all his personal prowess will count for little more than the fumbling of the paralytic. Yet connect the able bodied man with the fertile soil and the result will be a union of industry and preparedness to the great enrichment of life. Give the paralytic great quantities of fertilizer and he could do nothing, if left to his own devices. But give the normal man his share of plant food to use and he can perform wonders in a barren land.

This teaches us the difference between weak men and weak soils. The weak man is often a helpless piece of junk when beyond maturity, while the weak soil from countless ages of existence may be quickened and made to respond in a sudden burst of productivity.

May we not carry this a bit further

and claim that experience and science when applied by man have been able to do more for the land's sake than for human welfare—at least with greater certainty, less opposition, and more universal adoption?

I think we may be able to prove it. In America there are more redeemed areas of the "great desert" than ever were dreamed of in the fifties, more tons of pedigree grains than scrub arising from the harvest of science over the century, and a larger abundance of soil-born commodities than at any age of history. Yet man, the salt of the earth and the fulness thereof, is shedding briny tears on an empty stomach! He is even hard pressed to earn the right to till his own acreage.

Perhaps that's one reason why we are searching the booking office so hard now to find pilots in whom we can repose confidence. If people with plenty of victuals persist in going hungry, surely the land without men of vision will have a spell of indigestion. And thus we return to our soil analysis.

LAND as old as the earth's crust is easier to change and improve than men who have only passed their half century. Laboratory tests for soils and for men both have been used, but your soil doctor has a cinch beside the job which the mental or spiritual healer tackles.

Land, therefore, is a better fundamental investment, all things being equal, than the vagaries and whims of men. Climate alters the reliability of land values, and cussedness interferes with safety in the plans of men. But the investor can bank on the usual run of climate over a given region of land, while he is out on a limb when it comes to human behavior anywhere.

Your farmer on the land pursues his round of chores and daily business regularly and goes afield each spring with traditional punctuality. Your Wall Street broker, who deals in a realm of vague and changeful values, alternates between fever and ague. The man on the land is the symbol of confidence. The man in the stock and bond market is the embodiment of freakish uncertainty.

ERGO, the thing we must do now to make our investment in mankind secure and progressive on a higher human interest rate is to find out what we have done to land that makes it a sounder thing to depend upon and a calmer element to handle. We of the agrarian school have faith in the fundamental soundness of land, but we surmise that the inhabitants thereof are what makes things risky.

Apparently the economic and social controls or motives to benefit man are about where the chemical controls to improve the land were back in the eighteenth century. In those days Arthur Young demonstrated great care measuring *effects*, but chemistry was not far enough advanced so that he might determine *causes*.

He and other groping enthusiasts spoke of phlogiston, an unknown substance which escaped during the process of combustion. In their vain search for phlogiston (now an almost forgotten word) these men of early times found oxygen, nitrogen, hydrogen, and carbon dioxide. Only by the further delving of a French worker did the world finally learn that phlogiston was not to be found at all. Such was the first prime denouement in land management.

BUT we of today in man management are still looking for phlogiston—some miraculous element of adjustment which will enable us to preserve the human race from extremes of want and waste.

Bear in mind that back in Young's era there were bountiful crops produced, but nobody could exactly answer why or wherefore. Jethro Tull presumed he had the answer in using horse-hoeing husbandry as a substitute

(*Turn to page* 61)

The Use of Potash Aids In Reducing the Ravages of Diseases *and* in Producing Quality Crops

By
C. B. Williams
North Carolina State College of Agriculture and Engineering

IN experimental work in North Carolina it has been frequently observed that the intelligent use of potash salts in fertilizers has had a marked influence in materially reducing the prevalence of diseases and the damage to the yield and quality of corn, oats, cotton, tobacco, strawberries, and soybeans grown on different types of soil. Most of the diseases under observation have been due largely or indirectly, to malnutrition. As will be seen below, in many cases, the beneficial results following the use of potash have been quite pronounced.

Reduces Root-rot of Corn

In fertilizer experiments on typical eastern North Carolina muck soil at the Blackland Branch Station farm in Washington county in which a rotation of corn, Irish potatoes, and oats as major crops were grown, it was observed for seven years that the crops of corn and oats were particularly subject to root-rot when grown on certain of the plats of the field, while on other plats with different treatment its occurrence was decidedly less to none at all. The plats of corn and oats showing highest immunity to this disease were those which were treated with 16 pounds of potash per acre in the form of manure salt in the drill at planting as a supplemental application to phosphoric acid, nitrogen, and lime. Whenever the potash was omitted from the applications, the

root-rot disease occurrence and damage always ran high, and premature maturity of the crops took place.

The early maturity of the crops apparently was due to the diseased roots failing to function normally, the plants thereby being prevented from taking up adequate supplies of water and plant nutrients from the soil solution to meet the requirements of a normal healthy maturity of the crops. Not only this, but the diseased roots rotted off and thereby lost their power of holding up the laden stalks of corn. As a consequence, the stalks which had not received an application of potash always fell over badly in the field before gathering and gave a much less yield than was secured where this nutrient was supplied at planting time. The percentage of the stalks falling over was much greater, however, with the corn than with the oats. With Irish potatoes, grown in rotation with the corn and oats on this field, evidence of any development of this trouble, either where potash was supplied or where it was left off, was lacking.

Confirmed By Other Experiments

In experiments at the Coastal Plain Branch Station Farm on Norfolk fine sandy loam, where limestone had been added at the rate of 2,000 pounds broadcast every three years, a large percentage of the corn-stalks fell over with the use of lime. An examination of the stalks showed the roots to be practically rotted away and the inside of the stalks for several inches above the ground was rotten. At the nodes there was a reddish discoloration, due to an accumulation of iron which was more marked with the lower nodes and diminished with the nodes going up the stalks. The percentage of the stalks affected in this way varied on the unlimed plats from 5 to 15 per cent, while on the limed plats it ran from 10 to 75 per cent. The 15 per cent of stalks down on the unlimed and the 75 per cent down of the limed plats were both with those plats which had received no potash in the fertilizer mixture.

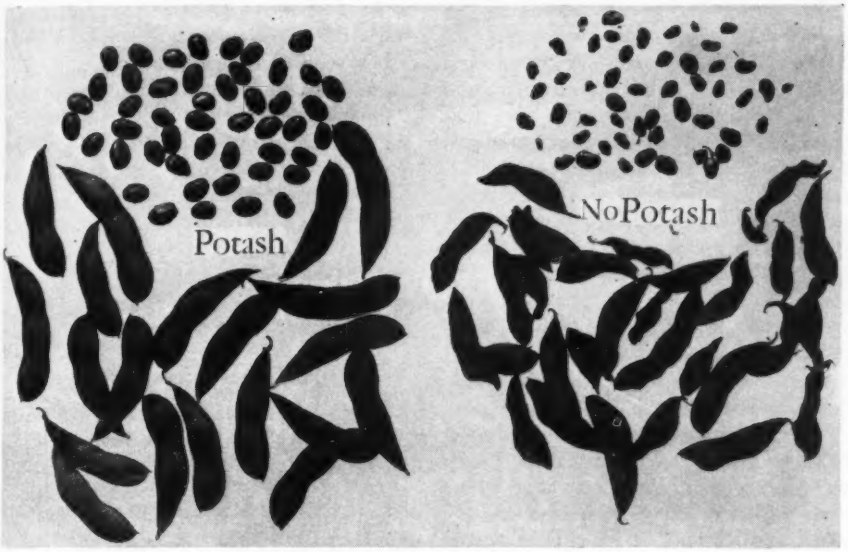
The effects upon the breaking over of the stalks of corn from the use of varying percentages of potash in 300 pounds per acre of a 6-6-0 fertilizer mixture were in 1926 as follows:

	Percentage of Stalks Broken Over	
	Unlimed	*Limed*
No potash	15	75
1 per cent potash	12	65
2 " " "	7	30
3 " " "	5	30
6 " " "	10	10

As is seen above, in a general way, the severity of the disease and breaking over of the stalks, for both the limed and unlimed portions of the field, varied indirectly with the percentage of potash contained in the fertilizer mixture.

In an experiment on Iredell silt loam in Davie county with corn, it has been found that by increasing the percentage of potash in a 6-10-2 (NPK) fertilizer mixture to 6 per cent, the yield of corn was increased 2.2 bushels per acre. Increasing the content of potash from 2 to 6 per cent in the same mixture led to an increase in yield of 6.9 bushels per acre. Frenching of the corn on this soil, which is of quite common occurrence, was prevented by an application of 200 pounds of kainit per acre at planting, supplying 4 per cent of potash in 600 pounds of a 6-10-4 mixture, while muriate of potash supplying 4 per cent of potash in the same mixture did not prove nearly so effective in preventing the occurrence of this trouble. The use of 600 pounds per acre of a mixture containing 6 per cent ammonia, 10 per cent available phosphoric acid, and 6 per cent potash increased the yield of corn 21.4 bushels per acre over unfertilized corn which was otherwise treated the same.

In experiments at Scotts in the Piedmont region of North Carolina



An application of 50 pounds of sulphate of potash made this difference in the size and development of pods and seeds of soybeans grown on Norfolk fine sandy loam in Columbus county, North Carolina.

with types of soil on which cotton, following red or sweet clover in rotation, is subject to suffer from what is known by farmers as black rust, the use of heavy applications of potash in complete fertilizers has been found to greatly reduce the percentage of the total area of the plants affected by this malady. On Davidson clay loam in 1931, the use on cotton of 600 pounds per acre of a fertilizer mixture containing 4 per cent nitrogen, 10 per cent available phosphoric acid, and 16 per cent potash (one-half of the potash at planting with the carriers of phosphoric acid and ammonia and the other half as a side-dressing when the cotton was chopped) gave two and one-half times the immunity to this malady given by an application carrying the same amounts of phosphoric acid and nitrogen per acre but no potash. Cotton, to which 8 per cent of potash with the above amounts of nitrogen and phosphoric acid were applied, was almost twice as immune as was cotton grown in the same field with only nitrogen and phosphoric acid.

With the "black jack" soils (Iredell and Mecklenburg loams and sandy and clay loams) of the Piedmont section of North Carolina, farmers are frequently troubled with a disease of cotton which they term rust. This malady, which is probably of a malnutritional nature, affects the leaves of the plants and causes them to drop prematurely in large numbers. With badly affected plants, all the leaves will usually be shed by the middle to the latter part of August, when the plants should be in full vigor in order that they may fully nourish and bring to completed growth the crop of immature bolls on the plants. When the leaves drop, the bolls stop growing, and when these immature bolls open, they do so imperfectly and produce seed and lint of inferior quality and which is very difficult to pick.

Find Potash Effective Control

Where cotton has been affected with this disease, farmers in large numbers are finding that the use of fertilizers high in potash are quite effective in materially reducing the ravages of the disease. Of the potash salts, kainit is decidedly preferred by most farmers.

In an experiment conducted in Cabarrus county for two years on Mecklenburg clay loam, it was found that the use of 600 pounds per acre in the drill at planting time of a fertilizer containing 4 per cent nitrogen, 6 per cent available phosphoric acid, and 4 per cent potash on an average gave a yield of only 750 pounds of seed cotton per acre. By simply doubling the percentage of potash in the mixture, making it 8 per cent, the yield was increased to 1,090 pounds, an increase in yield of 340 pounds of seed cotton per acre from the extra 24 pounds of potash added.

In experiments at the Piedmont Branch Station Farm, it has been observed for some years that with those plats which received no potash or very small applications of it, cotton rusted and corn frenched badly. The diseased condition of both crops has been observed to be much more pronounced on the limed than on the unlimed half of the plats. The results of these and other experiments have shown unmistakably that when a soil of this nature is overlimed, frequently one of the most effective treatments for profitable crop growth is the use of rather heavy applications of potash.

Reduces Diseases and Improves Quality of Tobacco

Experiments in North Carolina have shown that on many soils without the addition of small amounts of soluble magnesia to the soil, tobacco is frequently likely to suffer from a malnutritional malady known as "sand drown." This trouble is much more likely to occur on very sandy soils of both the Coastal Plain and Piedmont regions of the State than with the loamy soils of the two sections. The prevention of this malady can be easily and cheaply effected by adding to the fertilizer mixture to be used at planting time materials carrying soluble magnesia, like Epsom salts or sulphate of potash-magnesia, or by adding finely ground dolomitic limestone to the field some little time before the young tobacco plants are transplanted from the plant beds to the field. Too, when the affected plants are small, cheap soluble salts of magnesia, not carrying high percentages of chlorine, may be used to restore the plants to normal vigor and growth. It is generally recognized that tobacco is of a higher quality and in its growth is much less subject to attack and deterioration from diseases when supplied with an ample supply of available potash.

Requirements of Legumes

With legumes, such as red clover, sweet clover, lespedeza, vetches, soybeans, and cowpeas, it has been found that at least 4 per cent or more of potash in the fertilizer mixture is necessary to be supplied to most Coastal Plain and Piedmont soils to assure most satisfactory growth and yield. Crops like cotton following the legumes in rotation, particularly so if the legumes have been removed for hay, will be in need of liberal applications of this constituent, especially when the crop is grown on "black jack" and closely related soils, if the occurrence of rust is to be materially reduced or prevented.

Experiments with strawberries at Chadbourn in Columbus county, in cooperation with the Federal Bureau of Chemistry and Soils, have been conducted for the past two years. As a result of these, it has been found that the best source of potash for the fertilizer mixtures for this crop grown on Norfolk sandy loam is muriate of potash. Its use has given a higher yield of marketable berries than has either sulphate of potash or kainit. When using 1,500 pounds of fertilizer per acre, the mixture as has been shown should contain 6 per cent of potash with 8 per cent available phosphoric acid and 6 per cent ammonia, if best returns are to be secured. By increasing the per cent of potash in the fertilizer, the yields were not materially, if at all, increased, but there

(*Turn to page* 49)

This legume cover of principally sweet clover on Hillside Orchards, Haydenville, Massachusetts, was sown in 1930. On June 4, 1931, weights showed 9.68 tons of green matter per acre. This block of Baldwins has had complete fertilizer for the past two years. Yields of apples are shown in the accompanying story.

Complete Fertilizers *for* Orchards

By T. H. Blow

Springfield, Massachusetts

IMPROVED foliage and tree vigor, accompanied by increased yield and size of fruit, have resulted from the use of complete fertilizer, high in potash, during the past four years in six typical southern New England orchards. This improvement and increase has been produced at a cost within the reach of every fruit grower.

Fertilizer tests were started in these orchards in 1928 comparing three fertilizer treatments: 1—nitrogen alone; 2—nitrogen and phosphorus; and 3—nitrogen, phosphorus, and potash. All plots were limed to make the soils nearly neutral, as experiments have shown that fertilizers are most effective on soils which are only slightly acid. As much as three tons limestone per acre was needed in some orchards. The average amount of fertilizer used per mature tree was 6 pounds of a 16 per cent nitrogen carrier, 10 pounds of 16 per cent superphosphate, and 10 pounds of muriate of potash. In terms of complete fertilizer and on a basis of 27 trees per acre, the treatments of the three plots were equivalent to 500 pounds per acre of a 5-0-0 on the nitrogen alone plot; 5-9-0 on the nitrogen-phosphorus plot; and 5-9-27 on the nitrogen-

EFFECT ON YIELDS: (Given in both four and two-year averages)

(Annual Averages, yields in bushels per acre)

Fertilizer Treatment	*4 years, 1928-1931* McIntosh*	Baldwin**	*2 years, 1930 & 1931* McIntosh*	Baldwin**
N	232	375	262.5	372.8
NP	261	395	271.7	356.0
NPK	302	447.5	330.8	573.3
Gain for P	29	20	9.2	—16.8
" " K	41	52.5	59.1	217.3
" PK over N	70	72.5	68.3	200.5

*McIntosh in 5 orchards; **Baldwin in 1 orchard.

phosphorus-potash, a complete fertilizer, plot.

All fertilizer materials were applied to the soil surface and within the tree circle. Four of the six tests were in grass sod; one was under strip cultivation; and one was changed to a semi-permanent legume sod in 1930. Accurate commercial yields were secured on the plots by either tagging the trees in each block or by having someone record same at picking time.

The effect on yields given in both four and two-year averages is shown in the table above.

The effect on size of fruit was determined from gradings made on the Baldwin test in 1929 and 1931 and on the McIntosh tests in 1930. The increases in the top sizes on the complete (NPK) plot are clearly shown by the accompanying graph and tables:

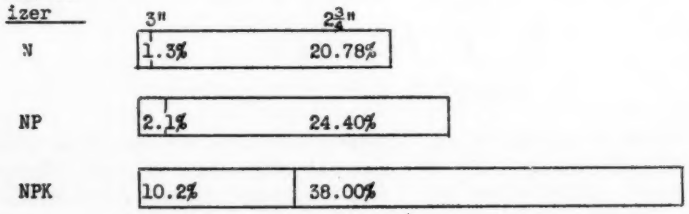
These increases in size, which usually bring a premium for every quarter inch increase, should interest the grower who is looking for maximum returns.

Taking a fair market value for the apples and deducting from this the

EFFECT ON SIZE OF FRUIT:

Baldwins, A & B grades combined, 1929 and 1931 crops.

Graph shows per cent of total yield in 3", 2¾" and total of these.



Sizes	N	NP	NPK
2¼ inch	34.22%	24.9%	11.7%
2½ "	37.3	42.5	31.1
2¾ "	20.78	24.4	38.0
3 "	1.3	2.1	10.2
	For McIntosh, 1 test, 1930		
2¼ "	9.1%	9.55%	2.2%
2½ "	31.8	38.10	25.5
2¾ "	50.0	47.60	46.8
3 "	9.1	4.75	25.5
2¾ & 3"	59.1	52.35	72.3

The Complete Figures on Baldwin Are:

extra cost of fertilizer, cost of picking the increased yields, and cost of extra containers (boxes or baskets), the records of the past two years show a net gain of $67.95 per acre per year from the use of potash in complete fertilizer on McIntosh and of $143.74 per acre annually on Baldwin.

With tree foliage, tree vigor, and color of fruit being measured by observation, at the end of the four-year period there seemed to be a definite trend in favor of the complete treatment, especially with the first two factors. These factors were very prominent on some of the plots and also quite noticeable to the growers during the season. They also seemed to be correlated with those plots giving the greatest difference in yields and also were more noticeable under the poorer cover crop conditions.

The foregoing results check with soil analyses made on these plots in 1930. Neubauer tests on 16 orchard soils (including the six tests) showed that the available phosphorus and potash are much too low for good growth, the only exception being on those soils which had received complete fertilizer for several years. With this test the optimum requirements are that a soil should contain at least 50 pounds of available phosphoric acid and 200 pounds of available potash per acre. A comparison of the three having the NPK treatment and the remainder receiving only nitrogen showed as follows:

	Plant Food per Acre	
Fertilizer	*Phosphorous*	*Potash*
Complete	57.2 lbs.	250.0 lbs.
Nitrogen alone .	12.2 "	138.8 "
Difference	45.0 lbs.	111.2 lbs.

These tests indicate that where nitrogen has been the only fertilizer treatment, the supply of available minerals is very low. This may be the reason why clover and other legumes do not make a satisfactory growth in many orchards. These valuable soil-improving crops need far larger amounts of available phosphoric acid and potash than these soils contain. Acidity tests of these soils showed that the majority of them are low in lime.

(*Turn to page* 44)

The legume sod on Avalon Farms, Bantam, Connecticut, was started in 1931. The seeding consists of alfalfa, sweet clover, red clover, rape, and the grasses. A 16-16-16 fertilizer at about 8-10 lbs. per tree was used in this area. Yields on Baldwins on this farm for the different fertilizer treatments were: N—209 bushels; NP—236 bushels; NPK—274 bushels. The picture was taken September 18, 1931.

Potato Profits in Arkansas

Left
1,000 lbs. 4-8-12 per A.
Yield—203.6 Bus. No. 1's

Right
1,000 lbs. 4-8-4 per A.
Yield—130 Bus. No. 1's

Farm of C. L. Paschall, Ratcliff, Arkansas.

By
A. G. Thomas
County Agent, Logan County, Arkansas

LOGAN county, Arkansas, ranked third among the Arkansas counties as a potato-producing county in 1929, according to the 1930 census report. Although this county produced a large crop of potatoes, many of the farmers know little about State certified seed or the proper amounts of commercial fertilizers to be used for potatoes.

In 1931 the price of potatoes was very discouraging and most of the growers preferred to keep their potatoes instead of marketing them. Six carloads were sold cooperatively, through the efforts of the County Agent. The price received for the potatoes that were sold more than paid for the seed and fertilizer, and then enough potatoes were left at home for home use for both food and seed for a second crop.

All potatoes that were marketed were graded very closely and where diseased potatoes were brought in, some observations were made. It was observed that where barnyard manure was used at planting time, the potatoes were invariably diseased. One grower brought in a very nice lot of potatoes and was questioned as to whether he had used barnyard manure. His reply was, "Yes, and this is the worst lot of potatoes that I ever raised. I had to cull out over half of them to get this many good potatoes."

In some cases the growers who had diseased potatoes reported that they had been using the same ground for potatoes for several years, and were observing that the potatoes were getting more diseased every year, in spite of the fact that they were planting certified seed.

The chief cause for diseased potatoes was the planting of diseased potatoes. Some merchants carried a stock of Grower's Certified Seed, which bore a tag with this inscription on it, "These potatoes are practically free from disease and suitable for seed." In examining these potatoes about 20 per cent were found to be diseased. When asked if they had certified seed, they would sell these seed, and in nearly every case the grower produced diseased po-

INCREASED POTASH MEANS INCREASED PROFIT

1,000 lbs. Fertilizer per Acre	Yield of U. S. No. 1's per Acre	Cost of* Fertilizer per Acre	Selling** Price per Acre	Fertilizer Profit per Acre	Profit from 4 Units Potash
No fert.	90 bus.		$42.85		
4-8-4	130.8 bus.	$17.00	52.13	—$7.72	
4-8-8	155.0 bus.	19.00	73.62	11.77	$19.49
4-8-12	203.6 bus.	21.00	96.71	32.86	21.19

*Cost of fertilizer per ton: 4-8-4—$34.00; 4-8-8—$38.00; 4-8-12—$42.00.
**Potatoes sold for 47½c. per bushel.

tatoes. When asked if he had planted certified seed, he would reply that he had and would name the merchant who was selling the grower's certified as State certified seed.

D. F. Wright planted his patch in Nebraska State certified seed on clean ground and used 600 pounds of 4-8-6 fertilizer with no barnyard manure. He brought 1,800 pounds of potatoes to the shed, and these potatoes were run over a Bogg's grader and inspected very closely. Only two potatoes were culled from his entire lot. E. B. Cravens had 5,100 pounds that were planted under similar conditions and turned out about as well.

In order to demonstrate the proper analysis of fertilizer to use for Irish potatoes, a demonstration was conducted on the farm of C. L. Paschall of Ratcliff, Arkansas. One-tenth-acre plots were used and 100 pounds each of the following mixtures were used per plot: 4-8-4, 4-8-8, and 4-8-12. Nebraska State certified seed at the rate of 12 bushels per acre were planted about March 1. The plot where 4-8-12 was used came up to a better stand and also came up earlier than did the other plots, and the 4-8-8 was ahead of the 4-8-4 and the no-fertilizer plots.

The potatoes were dug, graded and sold on June 15, with results as noted above.

This ground was planted back to second crop potatoes, but the fall drought cut the yield to practically nothing. There was no difference in the yield from the different plots, but the potatoes from the 4-8-12 plot were of much better quality than the others.

The DON'TS that are being preached to the potato growers of Logan county are as follows:

1. Don't plant potatoes on the same ground two years in succession.

2. Don't use barnyard manure at the time of planting. If barnyard manure must be used, apply it in the fall and allow plenty of time for it to rot.

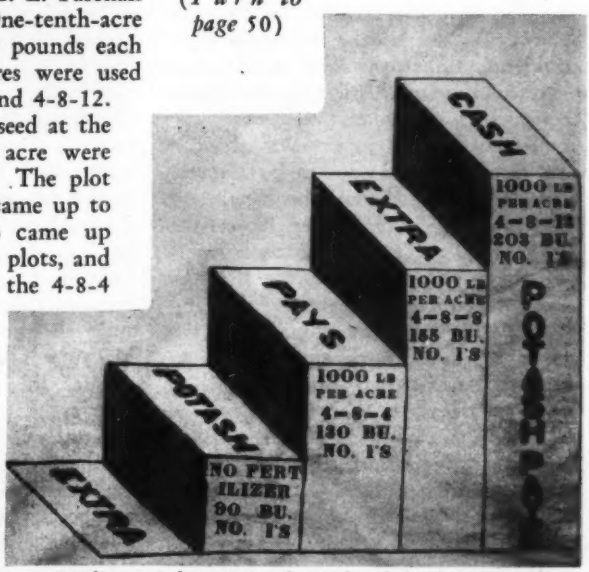
3. Don't plant diseased potatoes.

4. Don't be stingy with seed or cut the potatoes into too small pieces.

The "Do's" are as follows:

1. Plant on fresh ground where potatoes have not been grown for three years.

(Turn to page 50)



Another way of presenting the results of this demonstration.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

IT is fitting that we pay tribute here to the memory of James Wilson, of Tama county, Iowa. He worked wonders for agriculture, the farm home, and the people of America, when he served as Secretary of Agriculture under Presidents McKinley, Roosevelt, and Taft.

"Tama Jim," men familiarly called him, and he also earned the title of "Immovable Wilson," in recognition of the 16 consecutive years of his secretaryship. Not a moment of that long term was wasted. A practical farmer himself, he believed in and understood farming in all of its phases. He had also the confidence of the farmers of the land, recognized their problems, difficulties and needs, and therefore devoted his life to the championship of their cause.

His last annual report was written in 1913, when he was in his seventy-eighth year, and when his final call came, nearly eight years later, the workers of the Department of Agriculture recorded the esteem and affection they bore him in the following words: "His patriotic devotion to the interests of all the people, his vision and his practical wisdom place him high among those who have deserved well of their country. Beloved as a friend, admired and respected as an officer, his example as a man and a statesman is one to which all Americans may turn for inspiration and emulation."

James Wilson was born in 1835 on a farm in Ayrshire, Scotland, near the home of the immortal Bobbie Burns. There he grew up under the stern but kindly disciplinary guidance of his Auld Kirk parents. He was nourished chiefly on oatmeal, milk, and 'taties, and nurtured and admonished according to the tenets of the "Book" and the Shorter Catechism in the way he should go, and was early imbued with knowledge of his duty to God and man.

Had Natural Bent for Study

Thriftiness, too, was inculcated by example, and ability for labor learned by strenuous work in field and byre. Knowledge of the three "R's" was acquired at the district school, where a morose "M.A." pounded his precepts into his scholars with a heavy leathern taws which had been split into thongs and hardened by burning, to "mak them nippy." But Jamie needed little licking. He had a natural bent and aptitude for study. It is recorded that he was able to read at an early age and showed delight in literature. Macaulay's *History of England* was one of his favorite books and, of course, he mastered Burns and loved the tales of Sir Walter Scott. His teacher, John Ross, hammered the rudiments of Latin into his head, with maybe a smattering of Greek, and like all Scottish lads, he was so thoroughly drilled in 'rithmetic that, ever after,

he was a canny and capable counter of his bawbees (half-pennies). His intelligent and practical father, John Wilson, endowed him with sound common sense and his mother, gentle Jean McCosh, taught him to read and respect the Holy Bible. In time, he came to know its stories and precepts from cover to cover.

Bertha Ann Reuter, writing in *The Palimpsest* of the State Historical Society of Iowa, tells this story which illustrates how "Tama Jim" was, later in life, recognized as a Biblical authority. "During McKinley's administra-

JAMES WILSON

tion, at the close of stormy Cabinet meetings, the President was accustomed to turn to his Secretary of Agriculture with the question: 'Now, Mr. Wilson, what's the Scripture on that?' Mr. Wilson was ever ready with a pertinent passage—not always from the Bible. In Roosevelt's Cabinet, however, the tables were turned, and the President did his own quoting, often from sources unknown to Wilson."

In 1851, the Wilson family emigrated to the United States, with the hope of doing better in a material way. After spending four years in Connecticut, they joined the Scots settlement on Wolf Creek, in Tama county, Iowa, near the present town of Traer. There James worked on his father's farm, and that of his uncle, West Wilson. Just before the outbreak of the Civil War, James and his brother Peter began farming together. They had carefully hoarded their wages and with the joint sum bought 160 acres. Up to that time James, being the oldest of a family of seven boys and seven girls, had taken the lead in many matters pertaining to the home, church, school, and farm; but when war was declared, the momentous question of "who should go" had to be settled. James, naturally, insisted that he should have the honor of representing the family, but Peter, for once, kicked over the traces, contended that at last the time had come for him to lead, and he won his contention. The two young men agreed that when Peter came marching home again, the lands and livestock of their co-partnership should be equally divided between them. Peter survived his experience at the front, in due course returned home, and in accordance with their agreement, shared equally in the spoils of peace.

During Peter's absence, James had accumulated enough to buy the quarter section of land adjoining their original farm on the south. Buildings were then erected, equal to those on the quarter section they owned jointly before the war, and which had been allotted to James. Peter moved onto the new quarter and there his widow, now over 80 years old, is living today.

Both James and Peter acquired much land and were successful farmers, although James "dabbled into politics probably a little more than was good for his pocketbook," according to his son, Professor James W. Wilson, who is Director of the South Dakota Agricultural Experiment Station at Brookings.

Before his death, James Wilson gave his 1,200 acres or more of good Iowa

prairie farm land to the members of his family. The oldest son received the original 160 acres and a forty adjoining. He lives there today. The other children were also given farms, and so far-seeing, canny "Tama Jim" kept the lawyers from getting a slice of the melon.

A Lover of Fine Livestock

Wheat was the cash crop on the Wilson farms in those early days. Oats and corn also were grown and fed to livestock. Many calves were bought and fattened. Gradually, James and Peter built up fine herds of purebred Shorthorn cattle and Berkshire hogs, and sold bulls and boars far and wide. Later, when James Wilson Jr. took care of the records of more than 100 cows in his father's herd, there was in it a bull imported direct from Amos Cruickshank's noted herd in Aberdeenshire, Scotland, and two home-bred bulls of Cruickshank breeding.

The boys of the family loved livestock, and that may account for the fact that two of the brothers, David and West, later became famous in the livestock commission business of the Chicago Union Stock Yards. David died shortly after the firm was established, but West continued the business until the time of his death, a few years ago; then it was carried on by his son, Charles A. Wilson, who is now President of the Chicago Livestock Exchange and in charge of the future buying and selling of hogs. The commission firm has been sold, but it still operates under the name of W. W. Wilson & Company.

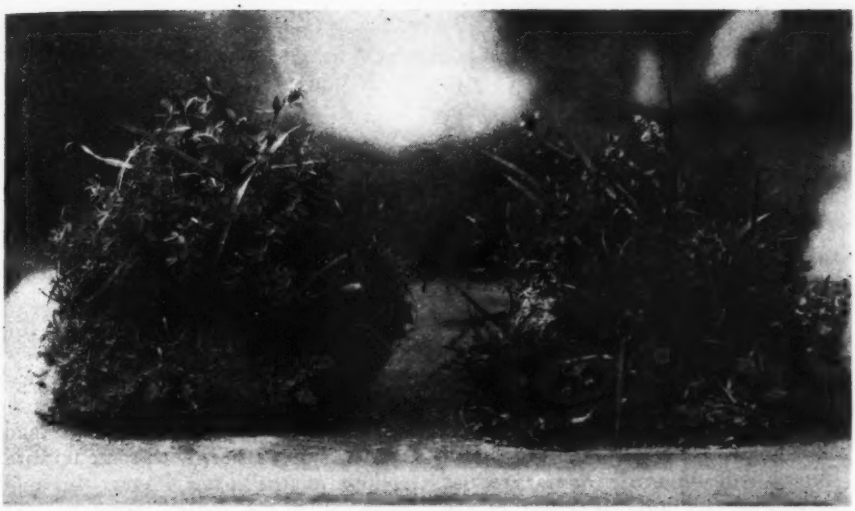
As James Wilson was kept busy in his early years running the home farms, he had little opportunity for higher education; but he spent three winters in the public schools, two as a student and one as a teacher, then he studied for a year in Grinnell College, Iowa. He never received an academic degree, but was honored with the LL.D. degree by the University of Edinburgh, Scotland, in 1904. That year the same title was conferred upon him by the University of Wisconsin and by Cornell College, Iowa, and in 1909 McGill College, Canada, honored him in like manner. These supreme honors came to him after years of active and useful political and executive service, but they did not give him what Scots call a "guid conceit o' himsel." He always was modest, though dignified.

Mr. Wilson's public service began when, having gained the esteem and confidence of his neighbors, they elected him to the County Board of Supervisors in 1864. Three years later, his constituency had widened, and he was sent to the State Legislature of Iowa as Representative from Tama county. His first election came in corn-husking time when he was busy all day long in the fields. He was determined, however, to make himself fit for his legislative work and therefore fastened a manual of parliamentary law on the end gate of his wagon and mastered the rules while he husked down the row of corn. You can not keep a good man down! Character is the immortal element in a human life, and it was practical and indomitable in "Tama Jim."

Received Many Honors

Greater honors were still to come to the enterprising farmer from Tama county. He served as a member of the 12th and 13th General Assemblies of Iowa and as Speaker of the House in the 14th Assembly. It has been said of him that he was "the man in whose hand the gavel of the House has, for the first time in the history of the State, been placed by the cordial consent of all the members of his own party." In his work in the Assembly he knew, from practical experience, what the farmers wanted and needed, and he actively strove to help them achieve their desires. Railroad regulation prohibition, suffrage, and revision of the fence laws were the dominant issues, and he had much to do with the

(*Turn to page 57*)



Left: 1,000 lbs. 0-10-10 per A. Right: 1,000 lbs. 0-10-0 per A.

Note the luxuriant growth of lespedeza on the left as compared to the growth made without potash. The proportion of Dallis grass to lespedeza was about the same in each plot, but note the difference in growth of Dallis grass in the two plots.

Fertilizing Lespedeza

By W. L. Myers

Richmond, Virginia

WE are hearing a lot about that splendid soil-conserving crop, lespedeza. It is being widely recommended as a poor-soil improver, as a good grazing grass, and even for hay. At all of the big agricultural meetings throughout this State, the subject of how to grow and use lespedeza is coming up for discussion.

One of the best things about this crop is its vigorous reseeding capacity which enables it to keep going for some years once it gets a good start. Not needing lime for its best growth as clover and alfalfa do, it is less expensive to prepare for, and also, the seed is cheaper than the seeds of some other legumes.

Very little is said about fertilizing this crop, but the writer tried out a pasture demonstration recently down in good, old Sussex county, in which the predominating grasses were lespedeza and Dallis grass, in order to find out what effect phosphate, potash, and nitrogen would have. Small areas were fenced off the ends of the pastured part of the variously treated plots so that the effect of the fertilizers could be observed.

One of the most interesting effects of the various fertilizer treatments was the change in the grass popula-

(*Turn to page* 60)

A necessary constituent of soils for potatoes is

Magnesium

By Jos. A. Chucka

Associate Biologist, Maine Agricultural Experiment Station

DURING the past few years a potato disease, indicated by a stunted and chlorotic appearance of the plants, has been observed in the potato growing areas of Maine. In 1929 this disease, or "potato sickness" as it was called by farmers, was so widespread and reduced yields so greatly that the Maine Agricultural Experiment Station began a study of the problem in an attempt to determine its cause. A large number of farms upon which this disease occurred were visited, and a study was made of the symptoms of the disease and the conditions under which it occurred.

These observations indicated that the disease usually appeared in patches or small areas within a field. In extreme cases whole fields were affected but the extent to which the plants were affected varied considerably from one portion of the field to the other.

The dominant symptom of the disease is a characteristic chlorosis of the leaves. Instead of having a normal dark green color, the leaves of the affected plants first have a yellowish green color which gradually changes to yellow and finally brown as the affected tissues die. This loss of green color begins at the tips and margins of the lowermost leaves of the plant and continues between the veins toward the center of the leaves and upward on the plant until in advanced stages nearly the whole area of the leaves is involved and all of the leaves are affected. In such severe cases the plants have a very marked chlorotic and stunted appearance, with some upward rolling of the lower leaves. In mild cases only the lower leaves of the plants are affected, while the new growth appears healthy. These symptoms seem to show up to the best advantage following a warm, dry spell when the potato plants are about 8 to 10 inches high.

Acidity tests of the soils in the affected areas indicated a high correlation between extreme soil acidity and the prevalence of the disease. As a matter of fact, wherever the disease occurred to any great extent, the soils thus far examined usually showed an acidity considerably below pH 5.0.

Start Investigations

These observations indicated that the trouble might be associated with plant nutrition on these acid soils. Consequently in 1930 a fertilizer test consisting of 18 different fertilizer treatments was planned and placed on two farms on which this disease was very pronounced the previous season. One of these treatments resulted in the production of perfectly healthy plants. This treatment consisted of 2,000 pounds of our standard 4-8-7 potato fertilizer plus 300 pounds per acre of magnesium sulfate (Epsom salts). This treatment not only produced healthy plants, but also increased the yield on the two farms by an average of 154 bushels per acre over the same

TABLE I

1930 Results with Magnesium in Potato Fertilizers

Treatment	Pounds of MgO per Acre	Yield in Bushels per Acre: Daigle Farm	Shaw Farm	Average of Two Farms	Increase Over Check Bus. per Acre
Check *	0	158.4	188.5	173.4	
Check + 300 lbs. $MgSO_4 : 7H_2O$	51	341.0	315.2	328.1	154.7

* Check consisted of 2,000 pounds per acre of 4-8-7.

amount of fertilizer without magnesium. These results are presented in table I.

These data strongly indicated that the disease was due to magnesium deficiency and that it could be prevented by the addition of magnesium to potato fertilizers. Following this lead, a test was planned in 1931 in which different amounts of magnesium from three different sources were added to the standard potato fertilizer. The materials used were Epsom salts, double sulfate of potash-magnesia, and hydrated dolomite. This test was placed on three different farms which were chosen to represent typical soil conditions in Aroostook county. Since previous results and observations indicated that the soils in the affected areas were strongly acid, it seemed advisable to determine the effect of neutralizing the acidity in these soils. Thus ground limestone (practically

TABLE II

1931 Results with Magnesium in Potato Fertilizers

Treatment	Pounds MgO per Acre	Yield in Bushels per Acre: Daigle Farm	Libby Farm	Bradford Farm	Average of Three Farms	Increase Over Check Bus. per Acre
Check *	0	326.2	368.8	386.1	360.4	
Check + 100 lbs. $MgSO_4 : 7H_2O$	17	345.7	399.9	405.9	383.8	+23.4
Check + 300 lbs. $MgSO_4 : 7H_2O$	51	339.9	396.8	370.7	369.1	+ 8.7
Check + 500 lbs. $MgSO_4 : 7H_2O$	85	326.4	391.6	379.2	365.7	+ 5.3
2,000 lbs. 4-8-7**	55	342.4	426.8	405.9	391.7	+31.3
2,000 lbs. 4-8-10**	78	367.4	405.6	416.6	396.5	+36.1
Check + lime***	0	323.4	363.6	381.4	356.1	
Check + 100 lbs. $MgSO_4 : 7H_2O$ + lime	17	358.9	397.9	391.6	382.8	+26.7
Check + 300 lbs. $MgSO_4 : 7H_2O$ + lime	51	349.8	392.2	392.4	378.1	+22.0
Check + 500 lbs. $MgSO_4 : 7H_2O$ + lime	85	353.9	399.3	377.0	376.7	+20.6
Check + 500 lbs. hydrated dolomite	150	346.2	379.2	377.6	367.7	+11.6
Check + 1,000 lbs hydrated dolomite	300	328.4	341.0	408.4	359.3	+ 3.2

* Check consisted of 2,000 pounds per acre of 4-8-7.

** Seven and ten units of potash were made up by using double sulfate of potash-magnesia.

*** Lime refers to ground limestone applied separately in the potato row at the rate of 1,000 pounds per acre.

free of magnesium) was used at the rate of 1,000 pounds per acre in the row in connection with fertilizer with and without magnesium. Field observations during the growing season again indicated that magnesium completely prevented the chlorotic appearance of the potato plants. The yields obtained from the various treatments are presented in table II. All treatments were replicated four times on each farm, and the results presented are averages of the four replications.

In comparing the 1931 results with those of 1930, it must be remembered that the 1930 results were obtained on fields upon which the disease was very pronounced, while the 1931 results were obtained on fields representing typical soil conditions in Aroostook county. It will be noted that all of the plots receiving magnesium gave somewhat higher yields than those which did not receive magnesium. The lower applications seemed to be more effective than the higher applications, indicating that the larger quantities of magnesium may have resulted in some magnesium toxicity. This seems to be substantiated by the fact that when lime was used with magnesium, the higher applications were nearly as effective as the lower applications. The results also seem to indicate that larger quantities of magnesium oxide may be used in the form of the double sulfate of potash-magnesia than in the form of Epsom salts. The comparatively low yields obtained with the use of dolomite may have been due to too large quantities of magnesium oxide. It is also interesting to note that when calcium limestone without magnesium was used with the fertilizer, the yields were slightly lowered. This may have been due to the depressing effect of lime on the solubility of the small quantity of magnesium present in these soils.

In addition to the work done with magnesium in potato fertilizers on our experimental plots, magnesium was used by commercial growers on some 200 acres of potatoes in Aroostook county during this past season. Where comparative yields were taken in these commercial fields between fertilizers with and without magnesium, the results indicated an average increase of approximately 44 bushels per acre in favor of the fertilizer carrying magnesium. Magnesium was also used as a side-dressing on a small area in two commercial fields after the potato plants developed very definite symptoms of the disease. It was applied as Epsom salts to a depth of about two inches between the plants in the row at the rate of 320 pounds to the acre. Observation of these areas during the remainder of the growing season indicated that the chlorotic tissues did not regain their green color but all of the subsequent new growth had a normal dark green color and the plants in the treated areas made a greater total growth than those which did not receive magnesium.

A very marked residual effect of the magnesium used on potatoes in 1930 was observed on the oats and clover this year. The oats and clover on these plots were fully twice as large as the crops on the remainder of the field. This observation indicates that other crops as well as potatoes are suffering from a lack of magnesium on some of the Aroostook soils.

The Causes of the Deficiency

This magnesium deficiency under Aroostook conditions has been brought about by several contributing causes. The large crops of potatoes grown have taken up definite quantities of magnesium. None of this magnesium has been returned to the soils because the tubers are sold, while the potato tops are raked and burned.

The large amounts of fertilizer used (equivalent of 2,000 to 3,000 pounds per acre of 4-8-7) with a high proportion of its nitrogen in the form of ammonia salts have greatly increased the acidity of these soils. This extreme

(*Turn to page* 54)

Tomato Production in the Northern Neck of Virginia

By L. B. Dietrick

Specialist in Vegetable Gardening, Virginia Agricultural Experiment Station

THE production of tomatoes for cannery in Virginia is an industry returning to the State approximately half a million dollars annually. For the period 1928-1931 the acreage devoted to the crop averaged 11,925 with an average annual production of 32,525 tons, or approximately 2½ per cent of the U. S. production.

This production is rather generally distributed throughout the State. Some 40 counties out of the 100 comprising the State produce tomatoes for canning. Strictly speaking, however, the industry is centralized rather largely in two districts. The first of these might be called the Roanoke District and comprises Bedford, Botetourt, Floyd, Franklin, Montgomery, Pulaski, and Roanoke counties. This district plants slightly less than 40 per cent of the State's acreage. The second area is known as the Northern neck of Virginia. This area comprises Westmoreland, Northumberland, Lancaster, Richmond, and King George counties and plants a little better than 40 per cent of the State's acreage. These two areas, comprising 12 counties, plant approximately 80 per cent of the tomato acreage of the State. The other 20 per cent is handled by the remaining 28 counties. The chief purpose of this article is to discuss tomato production for the cannery in but one of these areas, the Northern Neck of Virginia.

The Northern Neck of Virginia, justly celebrated for its historical contribution to the State, is a comparatively small strip or neck of land in Eastern Virginia approximately 75 miles in length and from 10 to 25 miles in width. The Neck is almost completely surrounded by water. To the north and northeast flows the Potomac River; on the east lies the Chesapeake Bay; and to the south and southwest flows the Rappahannock

A typical tomato plant bed in the Northern Neck.

River. At the upper end of the Neck, King George county connects with Stafford county at a point approximately 10 miles in width. The total area in the Neck is 971 square miles or approximately 2½ per cent of the area of the State.

No railroad lines enter the Neck. Agriculture must depend for transportation primarily on water outlets. Considerable trucking is done from this section, but by far the chief outlet is shipping. Shut off from the transportation lines of the mainland, it was but natural, therefore, that the growers should early turn to certain lines of production which were not particularly perishable. Canned products served this purpose admirably. Small canning factories sprang up throughout this section more or less like mushrooms. Very often the canner himself was also a grower. There has been a tendency in late years for some of the smaller factories to disappear or combine with larger ones. This tendency will, no doubt, become more and more apparent as the years pass. The small factory works at a tremendous disadvantage from the standpoint of overhead and efficiency. Larger units on the average are required for the most economic handling of the pack.

Soils Are Sandy

The soils of the Northern Neck are more or less sandy in nature. Distributed here and there one will find some medium clay loams, but a preponderance of the land is of the sandy loam type. Tomatoes produce well on all the soils of this area provided the land has not been neglected. The higher type of growers attempt to keep up the fertility of their soil through proper rotation and the wise use of cover crops.

Fertilizer practices show a wide variation. Studies have shown a range including the following: 0-12-5, 1¼-9-2, 2-8-2, 2-8-10, 3-8-3, 3-10-6, 3-8-10, 4-8-4, 5-8-5, 5-8-10, 5-10-5, 4-10-10, 4-12-4, and 4-16-12.

The analysis of the fertilizer used has improved considerably during the past few years, due in large part to extension work on the part of the county agents. No longer do you find many growers purchasing their fertilizer on the strength of the brand name or by a picture on the bag. One of the finest compliments that the writer has ever heard paid a county agent was by a fertilizer salesman for a house handling cheap goods. In speaking of a certain county agent in the Northern Neck he stated, "I can't sell any of my goods in that county since he has been there."

See Need of More Potash

The better type of growers use a 5-8-5 or better. Many of the growers in this area are live, up-to-date men and, encouraged by the canners, have done some experimenting with fertilizers themselves. There has been a growing tendency in some sections of the Neck to increase the amount of potash in the tomato fertilizer. Experimental work conducted by the Virginia Truck Experiment Station in this area would seem to indicate the advisability of increasing the potash content above 5 per cent. Extension semi-demonstration plots over a period of years have also seemed to point to increased benefits derived from the use of a higher per cent of potash in the tomato fertilizer. Some growers have been convinced on this point and are now using the higher analysis fertilizers mentioned, such as 5-8-10, 4-10-10, 4-12-10, 4-16-12, etc. It should be noted that where the potash has been increased, there has also been a tendency to step up the phosphorus.

The rate of application also shows a wide variation. Some growers use as little as 500 pounds per acre, while at the other extreme, some few use as much as 1,200 to 1,500 pounds per acre. The better growers approximate around 800 to 1,000 pounds per

(*Turn to page* 55)

Common Sense About Cotton

By J. N. Harper

Atlanta, Georgia

"WHAT shall I do about cotton? Shall I plant as much this year as usual—or shall I cut my acreage and grow more of other crops? What is the most economical fertilizer for me to use on the cotton I do grow?"

The average Southern farmer is eager to find the best answer to all of these questions. As a result of the general excitement over the low price of cotton, he has heard of South-wide plans to hold over part of the crop and reduce the acreage in 1932. Extensive diversification of crops has been recommended, and better marketing facilities are being developed. He has been told to cut his cotton crop in half and grow more food and feed.

Undoubtedly these are all good ideas and should receive the whole-hearted support of every interested party. The passage of time should bring them to take their place in a stable agricultural program for the entire South. Yet the individual farmer is today more vitally interested in his own particular and immediate problem.

What are the best steps he can take to help his own farm weather this economic cyclone which has apparently swept away the chance to make a profit from his chief cash crop? "What shall I do about cotton on my farm?" he asks.

Perhaps he is disgusted with the crop. Perhaps he has considered growing more sweet potatoes, grain, tobacco, or truck and fruit. No doubt he has thought of putting in a few extra milch cows and some hogs and chickens. Certainly he will grow more food and feed, and a year-round garden has become an absolute necessity.

But inevitably his thoughts come back to cotton. He cannot get around the fact that fundamentally his country is a cotton country. His farm is a cotton farm, his climate is a cotton climate, and his labor is cotton labor. Well, then, what to do about cotton?

Unless he wants to be forced out of his lifetime job by recurring drastic price upsets, there is only one thing he can do under the circumstances. *He must produce the cotton that he grows at the lowest possible cost per pound.*

Will He Fertilize?

How will this be done? Will he plant a large acreage to cotton and cut down on his fertilizer bill by using less fertilizer per acre or fertilizer of a poorer quality? This will simply make a bad situation worse because it results in a poor crop produced at high cost per pound.

How is he to produce good yields of high quality at low costs? Here is how one Southern farmer figured it out a few years ago. For years he had averaged 12 bales of cotton on 30 acres by using three tons of well-balanced fertilizer over the entire 30 acres. Along came a bad year, similar to this, when the price of cotton dropped very low.

(*Turn to page* 53)

South Carolina Produces High Quality Asparagus But Yields Are Too Low

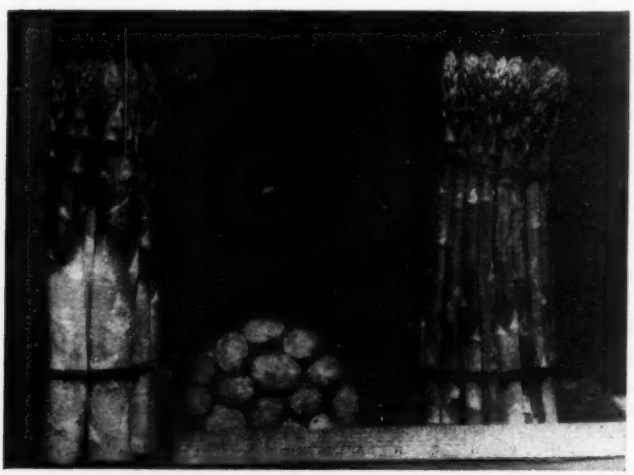
By J. L. Baskin

Atlanta, Georgia

SOUTH CAROLINA farmers have been growing asparagus for about a quarter of a century and yet asparagus yields are extremely low, being approximately 40 crates per acre. The only thing that keeps such growers in business is the unusually good prices that they have been able to get for their "grass." South Carolina asparagus usually comes on the market at a time when green spring vegetables are very scarce, and some seasons the only asparagus to be had on the market is from the fields of the old Palmetto State.

Relatively good prices have enabled growers to make a living and some money even with low yields. In spite of low yields South Carolina growers have been able to produce the finest quality asparagus found on the market as gauged by prices paid for it in comparison with asparagus grown in other States.

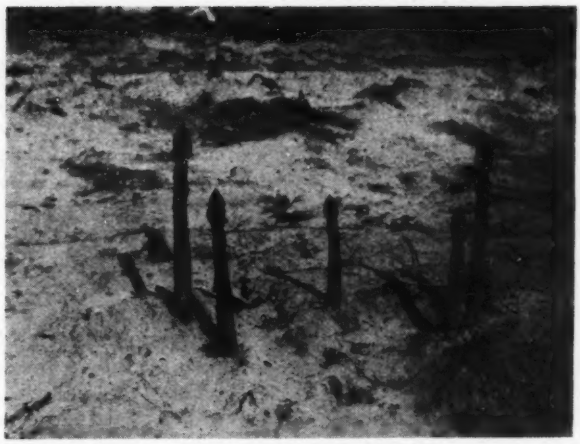
If California or New Jersey asparagus growers only produced an average of 40 crates per acre and were totally dependent on this crop for a living, they would starve. But if comparisons are to be made, it is only fair to state conditions under which the States of South Carolina, California, and New Jersey, the three leading States, are producing asparagus.



This asparagus is from the field of Lang Cave, Barnwell, S. C., and was fertilized with one ton of fertilizer carrying 8% K_2O and 500 lbs. muriate of potash, the muriate being applied after the cutting season.

California's claim that they "excel" is fully substantiated when their asparagus yields are compared to those of South Carolina. California produces an average of 179 crates per acre, while South

Carolina produces an average of 40. However, California's cutting season, a thing that greatly affects yields, is much longer than South Carolina's. California's cutting season is further lengthened by the fact that canning starts as fresh markets begin to wane. Again, California grows mostly white asparagus, while South Carolina produces green asparagus, the latter taxing the crowns more heavily on account of having to remain "on the hill" an extra day. During the past four years, the average farm price paid to growers was $3.17 per crate in South Carolina and $2.46 per crate in California. Add to this the fact that South Carolina has lower transportation costs and we are better able to understand how South Carolina growers survive with such a low average yield.



A good hill of Colossal "grass." *(Photograph by courtesy of Lewis P. Watson, Extension Horticulturist, Clemson College, S. C.)*

Asparagus Is Not a Field Crop

The conditions under which asparagus is grown in New Jersey and South Carolina are more nearly alike as to rainfall, soil, and spring seasons. In South Carolina, unfortunately, asparagus growing was first introduced in a section that was accustomed to producing field crops such as cotton, corn, velvet beans, and peas. In adopting asparagus the farmers considered it a field crop and proceeded to treat it as such with respect to cultivating, fertilizing, and harvesting practices. However, in the last 10 to 12 years many growers have found that asparagus should be treated as a truck crop in that it requires intensive cultivation, liberal fertilization, strict grading, and careful handling if prices on the market are to be satisfactory.

But custom and habit are strong forces. New asparagus growers, formerly producers of cotton and corn, were accustomed to fertilizing in early spring, which in the asparagus district is February and March. They, therefore, applied fertilizer to asparagus at this season, when there is considerable rainfall. The soil is mostly light and sandy. Couple these facts with the fact that spears are removed the day after they appear, and one can readily understand that there is no great absorbing power by the plant with no top at this season of the year, which means that much of the fertilizer is lost. There is plenty of evidence that the roots are active, but this does not mean that they are in position to assimilate large quantities of fertilizers. Much of their action is the result of stored energy from the previous season's growth.

Main Fertilization After Cutting

No doubt it is advisable to make small applications of fertilizer before the cutting begins, but the main fertilization program should be inaugurated and the rows (beds) well cultivated immediately after the cutting season. It is during this period that the plant is most active. Plants have a full top growth and can "manufacture" and store almost in proportion

to the plant food available and the surface of top growth exposed to the sunlight. This does not mean that high nitrogenous fertilizers should be used, for it is the role of potash to transfer starch and the other carbohydrates and store them in the crowns which are forming eyes that later vigorously send forth spears of colossal grade. Many growers now use one ton of complete fertilizer, carrying from 5 to 10 per cent potash, the major portion being applied immediately after the cutting season.

Many growers whose yields and quality are outstanding use, in addition to the fertilizer mentioned above, from 600 to 2,000 pounds of 20 per cent high grade kainit. Asparagus is not only a potash-loving plant, but it takes up and uses large quantities of chlorine which is supplied by the kainit. The trend today among South Carolina asparagus growers is toward better stands, better strains, more liberal fertilization, and keeping up the high standardization that the various South Carolina associations have established for Palmetto Colossal on the market.

Is Truck Crop in New Jersey

In New Jersey, growers consider asparagus a truck crop and treat it accordingly, which means that it gets every necessary care including liberal fertilization to make their average yields stand far ahead of South Carolina's. New Jersey's average yield is 100 crates, but it is only fair to say that on account of their proximity to markets, they can extend their cutting season most years in proportion to the strength of the market, and long after South Carolina cutting becomes unprofitable due to low yields. The only field in which South Carolina growers excel is quality, which is reflected in market prices. The past four years New Jersey received only $2.48 per crate, as compared with South Carolina's four-year average farm price of $3.17 per crate.

There is abundant evidence that South Carolina can produce an average of 100 crates per acre. The growers merely need to follow the example of such men as J. R. Lott of Williston, who is South Carolina's champion asparagus grower and who averages 124 crates per acre on his fields. How does Mr. Lott get such good yields? First of all, he has probably the best and thickest stand of asparagus in South Carolina. Realizing that a thick stand pulls heavily on the soil, Mr. Lott fertilizes liberally, using a ton of complete fertilizer carrying high potash. Soon after the cutting season, he applies a separate application of 20 per cent high-grade kainit to make more of his "grass" grade colossal.

Show Improved Yield and Quality

In 1930 the asparagus growers held their State meeting at Aiken, S. C. Seventy-five per cent of the South Carolina acreage was represented. During this meeting, growers submitted their fertilizer practices and yields. A study of the records turned in showed that those who used 8 per cent potash in their fertilizers averaged 12.7 more crates per acre than those who used 5 per cent.

A similar questionnaire was answered by the growers assembled in Williston, South Carolina, in 1931. A study of these records showed that those using 10 per cent potash were far out in the lead both as to quality and yield.

A splendid example of what growers may expect potash to do for their asparagus fields is found in the record books of Lang Cave of Barnwell, South Carolina, and Paul J. Fulmer of Allendale, South Carolina. Both these men produce asparagus on a commercial scale and have been doing so for years, but they were not satisfied with their yields.

Just after the 1929 cutting season, Mr. Cave fertilized his young asparagus with a complete fertilizer carry-

(*Turn to page* 50)

Kainit Controls Weeds

Paul A. Fisher

Manager of Fisher Orchards,
Burlington, Ontario

Where no kainit was applied, there was a thick covering of weeds.

CONTROLLING weeds in asparagus beds is always a great problem. The two methods generally followed in the asparagus-growing region near Burlington, Ontario, are hoeing and the heavy application of salt.

There is considerable controversy among the various growers as to which is the more economical, as the salt has to be applied at the rate of from 1½ to 2 tons per acre, and while it will kill the weeds if applied while they are young, it has no other value. Our salt has been costing us from $10 to $13 per ton. Hoeing usually costs us from $20 to $30 per acre per year, and while it keeps a mulch on the surface of the soil, it does some damage by cutting the young shoots that are just coming up.

In the Spring of 1931, we tried out one-half ton of kainit on one of our patches. We applied it at the rate of 50 lbs. per row, or 1,000 lbs. per acre, on the first three rows; 100 lbs. per row, or 2,000 lbs. per acre, on the second three rows; and 150 lbs. per row, or 3,000 lbs. per acre, on the third three rows. These rows are four feet apart, and the kainit was applied only to a strip about one foot wide where the asparagus was growing and where we could not cultivate, and was applied in exactly the same manner as we have applied the salt.

These applications were made the last week in May, when we were hoeing the patch for the first time. The young weeds were coming up very thickly at the time, particularly pigweed *Amaranthus retroflexus,* Linn., lamb's quarters *Chenopodium album,* Linn., and chickweed *Cerastium arvense,* Linn., the nine rows which received the kainit were not hoed.

It was several days after the application was made before the weeds in these rows began to die, but when we hoed the balance of the patch for the the second time some two weeks later, all the weeds in these nine rows were destroyed except a few lamb's quarters which were quite large at the time of application.

(*Turn to page* 41)

After an application of kainit, weeds were scarce and no hoeing was necessary.

The Use *of* Potash in Indiana

By S. D. Conner

Research Chemist, Purdue University

THERE are three classes of soils in Indiana that respond in a marked degree to potash fertilization. These three groups are:

Muck and peat soils which are very high in organic matter but low in total and available potash in both surface and subsoil.

Sandy soils which vary in organic matter and which have a medium to high amount of total potash, but are quite low in available potash.

White flat silt loams which are quite low in organic matter, medium to high in total potash, but low in available potash, particularly in the surface layers, but not so low in the subsoil.

The remainder of the soils of Indiana, which include the gently rolling to hilly silt loam and clay soils, are variable in their potash needs depending upon the state of erosion and the length of time and way they have been cropped and manured. Some eroded slopes show practically no need for potash. Many of the overflow lands show no need for potash.

Large Amounts of Potash Removed

Potash is removed by crops in larger amounts than any other mineral element. A two-ton per acre hay crop will remove about 65 pounds of potash. In a corn crop of 50 bushels, 25 pounds of potash will be found in the stalks and only about 15 pounds in the grain. A ton of wheat straw contains from 12 to 20 pounds potash, while 20 bushels of wheat grain that goes with it has only about six pounds of potash.

It may thus be seen that where hay, straw, corn fodder, or silage is removed from the field, there will be a heavy drain on potash. This potash may be returned if these materials are fed and the manure conserved and returned to the land. The potash in crops is water soluble and it will be easily lost if the straw or manure is exposed to rain. A livestock system of farming will be much more exhausting on the potash than a pure grain system if the manure and crop residues are not carefully returned.

Subsoils Contain Potash

While some soils contain large quantities of potash, constant cropping and removal of potash, particularly from the surface layers, will in time bring the available potash level so low that potash fertilization is needed if we wish to continue to grow good crops. Fortunately the subsoils of many Indiana clays and loams contain large quantities of available potash. Unfortunately, however, the roots of corn and other grains often do not penetrate deeply enough for this subsoil potash to be of any benefit. On such soils it is necessary to use potash in liberal amounts in fertilizers to start the crop. Often corn will show signs of potash starvation in the early growth, while later the roots will have penetrated

more deeply and the crop will get sufficient potash.

Any condition such as poor drainage, that prevents corn roots from penetrating the subsoil, will cause potash depletion in the surface layer. We may have good, deeply rooted corn near the tile lines, while farther away the roots will penetrate no deeper than the plowed soil and the corn will starve for lack of potash. The attack of insects such as the corn root web worm or a bad case of root rot will often cut off enough roots to prevent the proper assimilation of potash. Potash fertilization will help to grow a normal crop under these adverse conditions.

Much of the beneficial effect of deep rooted crops, like sweet clover, can be attributed to the fact that they penetrate the otherwise impervious subsoil and not only feed deeply but when other crops follow, the decaying roots leave convenient channels for the grain roots to penetrate down into the subsoil where there may be an abundance of potash.

The farmer who has level, poorly drained clay or loam soils whose surfaces are depleted of available potash, may do one of several things to furnish potash to his crop.

He may make a liberal application of farm manure which contains approximately one-half per cent potash; he may increase his tile drainage and thus give the roots a chance to penetrate more deeply into the subsoil; or he can grow sweet clover or alfalfa. Red clover will help some, but it is not as good for this purpose as the more deeply rooted alfalfa or sweet clover. If he has done none of these things, the farmer still has a chance. He may use a fertilizer rich in potash. Rest assured the crops must have potash in liberal amounts, and if the farmer does not care for his land in such a way that the crops may feed on the soil potash, then he must buy potash or fail to grow good crops.

It may be necessary to lime and fertilize the land to get a good stand of sweet clover. In such cases liming

(*Turn to page* 41)

White flat silt loam soil from southeastern Indiana, 17th crop. The left-hand series had various phosphate and nitrogen treatments. The center series has had lime in addition to phosphate and nitrogen. The right-hand series has had potash in all pots in addition to phosphate, nitrogen, and lime. This illustrates how severely the crops had depleted the soil potash.

Spending *for* Profits

By R. E. Stephenson

Associate Professor of Soils, Oregon State Agricultural College

A LEGITIMATE investment which gives reasonable promise of more than 100 per cent profit in six months to a year is rather rare. Yet this and more have been done by farmers using commercial fertilizers to grow farm crops. Not one but many have testified to the efficacy of fertilizers for bolstering up a "none-too-productive" soil to a profit-yielding basis. No other incentive except a good margin of profit could insure the continued and gradually increased consumption of fertilizers.

A few years ago the National Fertilizer Association after interviewing 48,000 farmers arrived at the conclusion that the return for each dollar invested was about $3.50. This represented the average estimates made by the users who were paying for the fertilizer out of their returns.

A neighbor's son in going over these figures asked this pertinent question: "If fertilizing is so profitable, why is not more used?" A good question all right, and not to be answered without some consideration. These estimates made by the farmers check very well with the records of some 30 or 40 experiment stations, where returns are carefully calculated. The Michigan Station reports returns of $37 to $107 an acre from fertilizing sugar beets. The New Jersey Station reports that tomatoes and vegetables give net returns of $30 to $100 per acre for fertilizers.

A partial answer to the boy's question, however, is found in the observation that not all the return is "velvet"—that is, it costs something besides the fertilizer to produce the crop increase. There are an extra handling cost and other items. Assuming that the fertilizer represents reasonably only one-half the cost of the increase, the profit is still abundant.

"The trouble is," someone has said, "fertilizing has been too profitable and that is part of the reason for the present overproduction."

In a center of specialized agriculture a prominent farmer was asked whether he thought commercial fertilizers would be much used next year. His reply was, "I hope so. We do not need more acres but fewer in crops—fewer acres better farmed to produce yields that are profitable." He further stated, "I am making some profit this year, because I have always fertilized liberally, and my soil is productive beyond paying the cost of production." Said he, "One must eliminate boarder acres just as the dairyman eliminates boarder cows."

Fertilizers Go With Intensive Methods

Thirty-two States use significant amounts of commercial fertilizers. Of this area the centers of most intensive development use most. In New England the potato growers of Maine and the onion and tobacco growers of Connecticut commonly use a ton to the acre. Likewise the truck farmers of the Middle Atlantic States fertilize liberally. Lettuce growers still spend $35 per acre for fertilizers. In the South Atlantic States the celery grower of Florida is finding it profitable to use not pounds but tons of high-grade

(*Turn to page* 51)

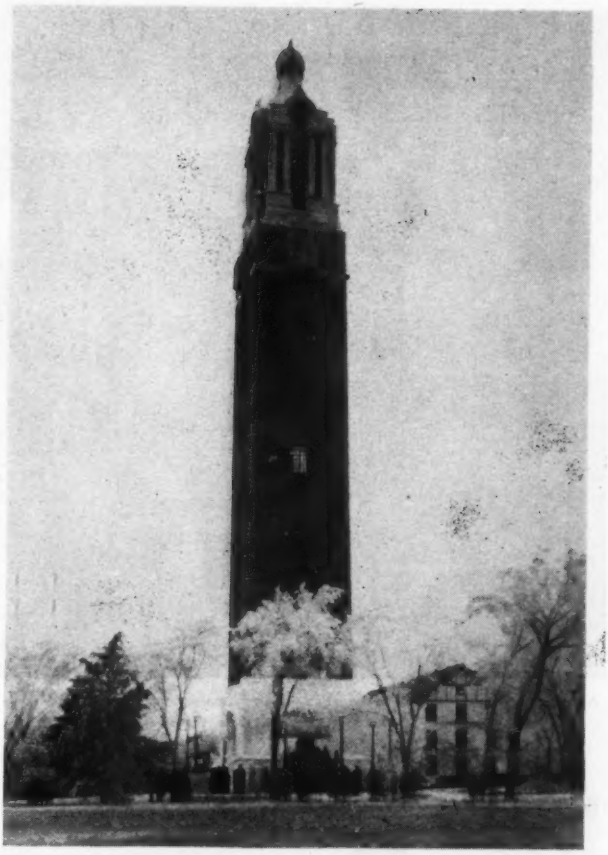
HAPPY EASTER

PICTORIAL

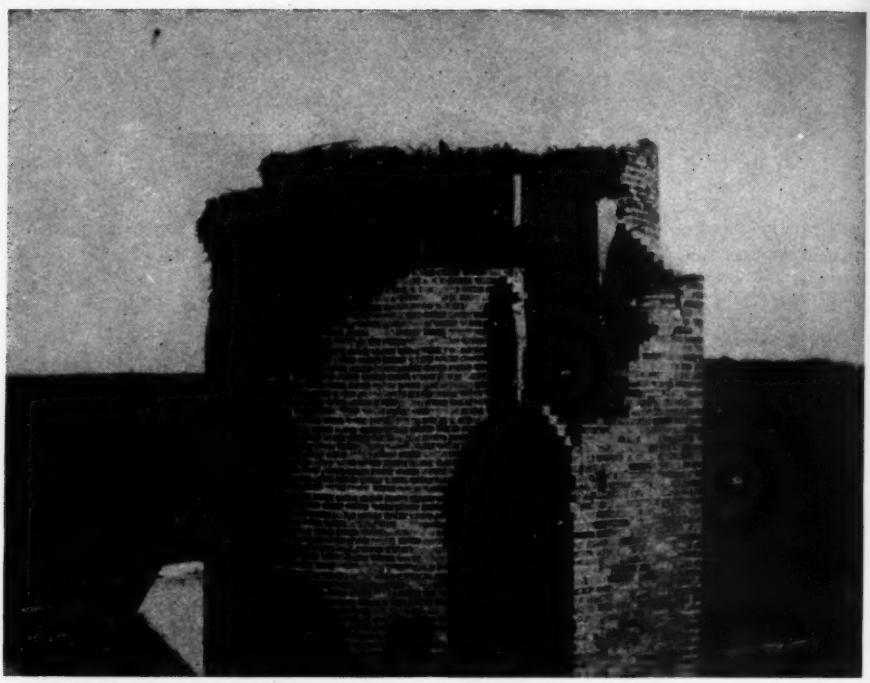
Above: When ice leaves the quiet, little streams, Spring is not far away.

Left: Corn in the shock at this time of the year means cold fingers.

Right: The Coughlin campanile on the South Dakota State College campus is the tallest structure in South Dakota.

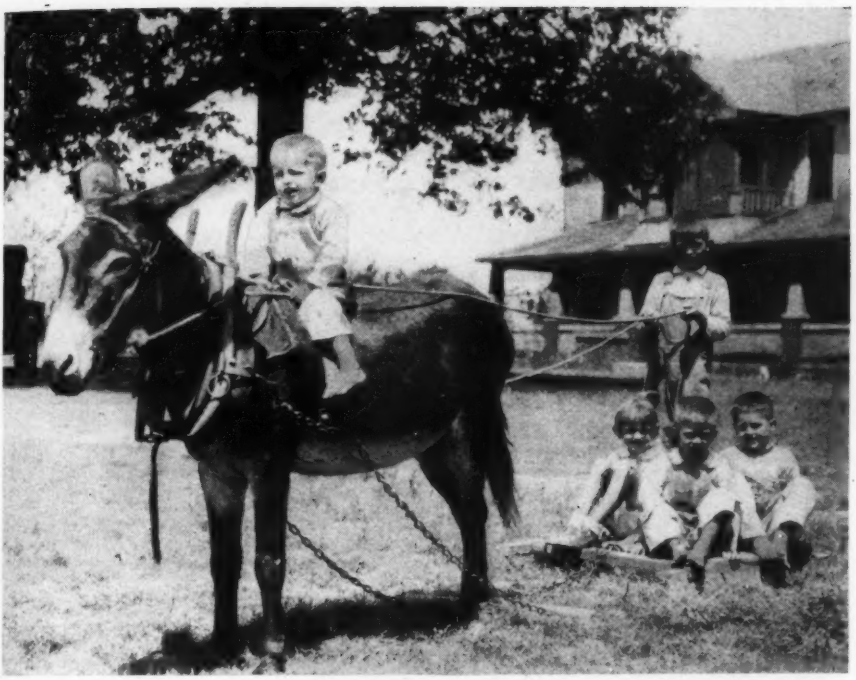


Below: On a sizzling day in July, a memory of this spot might prove refreshing.



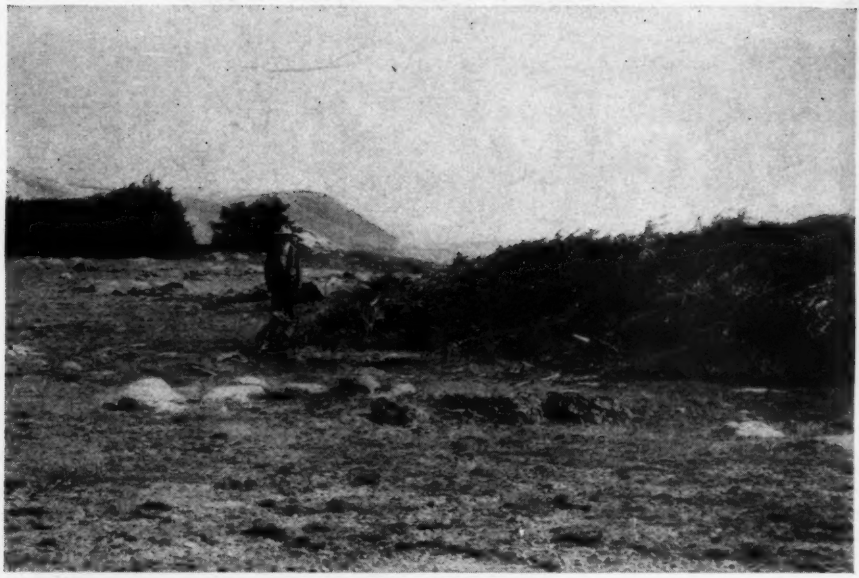
Above: A freak trick of a tornado in southeastern Wisconsin tore away the brick wall of this silo, but left the silage intact.

Below: The round barn, once a common sight, is becoming a curiosity.



Above: Happily these farm children in Arkansas start for a ride with an improvised conveyance of no great speed or assurance of "getting there."

Below: Still interested. Big Brother is a little too old to partake.



Above: The peculiar shape of these trees at the timber line in the Medicine Bow mountains, Wyoming, (11,000 feet elevation), is due to the strong winds which sweep the range.

Left: In contrast to the peculiar trees pictured above, this big oak is 165 feet high and 14 feet in diameter. It is the largest oak in Round Valley, Mendocino county, California, and is estimated to be 1,450 years old. The man shown is the largest man in Round Valley. He is more than 6 feet tall, weighs 450 pounds, and is a big rancher butcher who works every day in his shop.

The Editors Talk

The Agricultural Outlook

Substantial improvement will have to appear in the basic industries, as in the construction, automobile, textile, and iron and steel industries, before farmers will be warranted in counting on a return to prosperous domestic demands for agricultural products in the near future, is the vital part of a 120-page statement of "The Agricultural Outlook for 1932," just published by the Bureau of Agricultural Economics.

In making this annual survey of agricultural conditions at the beginning of each year, the Bureau is assisted by the State agricultural colleges, extension services, and the Federal Farm Board. Its purpose is to face the facts and give such facts for the benefit of farmers and others interested in adjusting agricultural activity to present conditions. And as a large number of competent authorities assist in compiling the material, the outlook presents a well-rounded and detailed study, valuable to anyone interested in knowing just what the present agricultural situation and trends are.

The very severe drop in the price of raw materials and in volume of activity of basic industries is in line with the economic teaching that normally there is usually a greater fluctuation in the price of raw materials than in the price of consumer goods. For instance, the price of wheat often drops much more severely than the price of flour, and the price of flour more than the price of bread. Consequently, as pointed out in the outlook report, recovery in the basic trades must precede a greater domestic demand for agricultural products.

Equally as serious and possibly more so, is the loss of an important part of the foreign market for wheat, pork, tobacco, and to some extent for cotton. Foreign competition and demand occupy several pages and is a section of much importance in the report. That foreign demand for domestic agricultural products has fallen to a very low level is fairly well known, but the report adds rather significantly that "there is very little definite evidence of significant improvement in the near future." The protection of domestic markets abroad by import restrictions is pointed out as an adverse factor. The outlook says: "By and large the past year was one in which import barriers already high in most foreign countries continued to mount." . . . "In scarcely an instance was there any significant abatement."

Regarding Cotton

A more hopeful statement refers to cotton. For "cotton is a notable exception to the general tendency to maintain production in foreign countries. Except for Russia, there appears to be a world-wide tendency towards acreage reduction. This is especially true in the new cotton-growing regions of Africa, such as the Anglo-Egyptian Sudan. In Egypt the government is restricting cotton acreage. In India the cotton acreage in 1931-32 was the smallest since 1922-23." Thus, in a study of the cotton situation it is now clear that the produc-

tion outside the United States has been materially reduced. And further, as prices of cotton produced in other countries have risen, mills are turning more to American cotton. Therefore, the increases in cotton consumption noted earlier in the season may be of some significance. At the same time, the world's supply of all cotton for 1931-32, estimated to be 41,600,000 bales, is a very important factor in considering the outlook.

As gross farm income from the important fertilizer-consuming crop areas is a most important factor affecting the purchase of fertilizers for the following year, the outlook for certain crops, especially cotton, tobacco, corn, and potatoes, is particularly important. As is well known, the gross income for 1931 was much smaller than in former years; therefore, fertilizer consumption in 1932, for the country as a whole, will also be much smaller. Conditions affecting cotton production have already been noted.

The tobacco situation is characterized by large supplies of leaf and a diminishing rate of consumption of tobacco products, declining exports, and very low prices to growers.

The potato outlook is governed by the apparent intention at this date to make only a slight decrease in acreage in 1932. With fair chances of a better growing season than in the past three years, potato growers in the late producing States face another season of increased supply. Against this probable large supply of potatoes, there are no definite indications that there will be any improvement in demand conditions.

Regarding the corn outlook, the prospective acreage of corn is likely to be large enough so that if only average yields are obtained, corn production in 1932 will be larger than any year since 1923 and near to a record crop. It is possible, however, that owing to a larger livestock population on farms, this prospective larger supply of corn will be used to better advantage than in 1923.

It is encouraging to note that for the first time in seven years there has been a noticeable downward adjustment in wheat production. This applies to all wheat acreage except in Russia and China.

Dairy products are in a relatively more favorable situation than most other farm products; prices the last two years having declined less than the average by some 30 per cent.

There were more cattle in the United States on January 1, 1932, than on the same date a year ago, but fewer cattle on feed for market.

The credit outlook is discussed in detail. The statement points out that deposits at country banks have decreased substantially in recent years and the supply of farm credit available from local sources is considerably less. The primary cause of these declines has been the low prices for agricultural products. The statement concludes that the "extent to which these adverse factors continue to operate during the coming year will be largely dependent on the degree to which confidence is restored in the banking situation." It is noted that many government agencies have been organized to establish confidence.

Two Concepts Are Clear

Out of this detailed survey whatever may be uncertain regarding the future, two concepts are clear.

First, there will be advance notice before there is any substantial recovery in the purchasing power of the farmer sufficient to favorably affect any of the trades catering more specifically to agriculture, as the fertilizer industry. The reason for this is that before the farmer can spend larger amounts of money for his purchases, he must himself have received an increase in farm income or credit, and in turn, before he himself receives an increased income, conditions

must improve in industry, particularly in the basic industries, and for foreign demand, market conditions must improve abroad.

The second concept is that the successful farmer, or the successful industry serving the farmer in the immediate future, will be one that can operate under a relatively low price level, which means adjustments to such price levels.

But is this a discouraging picture? No. It is true that the present going is relatively hard, but as the inevitable result is to compel a greater efficiency in agriculture and agricultural industries and as the future will undoubtedly witness substantial recoveries, present conditions may ultimately be productive of more real good than now seems to be the case.

Crop Diseases

We are always very glad to publish an article from such a well-known agricultural authority as Professor C. B. Williams of North Carolina. His discussion on the prevention of certain crop diseases is both instructive and interesting.

As Professor Williams points out, most of the diseases which are the subjects of his observations in this paper have been due directly or indirectly to malnutrition. Root-rot of oats and corn, the too early maturity of these two crops, the accumulation of iron in the nodes of corn-stalks, frenching of corn, the "black rust" of cotton, "sand drown" of tobacco, the marketing quality and spoilage of strawberries, and the quality of soybeans are some of the important topics discussed in this article. The information is of great value, not only to the farmers of North Carolina in which State the experimental work on which the observations are based was conducted, but to all growers of these crops anywhere.

What Shall We Believe?

In these days of world complexity and overproduction, sound beliefs, not goods, are at a premium. For no seer is needed to tell us that the present age is one of profound world change; 1931 marking another milestone in the present period of social change.

And as in the days of old, the handwriting is again on the wall. But in that ancient day, the handwriting was interpreted for the troubled king; today who can so interpret it? With all the contending viewpoints on world monetary standards, over-production and quotas, inflation and deflation, debts and moratoriums, unemployment and its relief, falling prices, the speeding up of life by scientific effort, and other complexities—all demanding interpretation and solution—who are the false prophets and who are the true?

Confusion and instability of thought are dominant. The established social and industrial rhythm has gone; the new is not yet established. Often we are inclined to feel that anything we know may yet be worth but little; that everything we have accomplished may yet prove ineffectual. We weary of the constant analysis of changing phenomena; of the search for exact fact and proof; and of the study of conflicting expert evidence, first in support of one view and then another.

Against such a background, man ultimately tends to discard too much quest for further proof and to consolidate his thinking into simply defined beliefs as his motive force; the surest beliefs his knowledge and experience provide. For it has been so in all great periods of social change.

With this very human course of action as an age-long precedent, let us always believe in something; the best we can think of. Let us remember for instance the vital and essential character of the great industry, agriculture, with which we are associated; the very necessary character of industries that serve agriculture; that agriculture and the industries serving it must continue; and that even in these days of depression there are at work economic and social forces which will ultimately compel a much fairer distribution of the farm and city dollar and a fair return for farm labor. It is undoubtedly true that much of the change now taking place will ultimately be for the best, entailing, as change always does, present sacrifice and adjustment to reach the ultimate goal of a more stabilized and true prosperity.

May we lay hold of some simple and sustaining belief to carry us through.

Common Sense About Cotton

With the present low prices of cotton and a great deal of talk about reducing the acreage, what is the cotton farmer to do? This is a very important and all-absorbing question, not only to Southern farmers, but to interested groups all over the country, for much general prosperity depends on a prosperous cotton belt. We are, therefore, very glad indeed to publish an article on cotton by J. N. Harper, who for many years was the Director of the Agricultural Experiment Station of South Carolina, and who over a long period has studied the scientific and practical aspects of the cotton crop.

As Mr. Harper points out, there is a great deal of merit in many of the proposed agricultural programs, such as crop diversification, but in the last analysis the natural crop, to which are adjusted all marketing, financial, and labor systems in many parts of the South, is cotton. Therefore, whatever is done about other crops, the problem of the cotton crop still remains. Mr. Harper has given a very interesting and instructive discussion on the answer to this problem.

They Know What to Keep

County agricultural agents are one of the necessities which Southern farmers will not give up, even in the depression. A north Mississippi report shows that not a single agent will be lost this year out of eighteen in the district. And the reason is found in the further report that counties having agricultural agents are "in the best condition as regards feed and foodstuffs for farmers' home winter supply." The counties which can't afford county agents now are the ones which haven't had them in the past.—*Purdue News Service.*

The Use of Potash in Indiana

(*From page 29*)

may be a means to the end of aiding the corn to secure soil potash. This seems paradoxical when other evidence indicates that lime in itself tends to make potash less soluble. It would be only on land on which you could get it to root deeply that sweet clover would be helpful in furnishing potash. On some of the flat, deeply acid soils of southern Indiana, sweet clover is itself a shallow rooted crop on account of an impervious or very acid subsoil. On such lands it would merely help to rob the surface soil of its potash. Soybeans on any soil tend to be more shallow rooted than the clovers, and for that reason and also because they remove large amounts of potash, leave the land in a condition so that crops that follow should be rather heavily fertilized with potash.

To summarize, we would say that all crops should be rather heavily fertilized with potash on muck soils and on either dark or light colored sands. The more lime these soils contain, the more they are apt to need potash. The flat white soils also need fairly heavy percentages of potash.

The quantity of potash to use on any soil depends upon the kind of crop to be grown. High money value crops will, of course, return a larger profit from high fertilization than grain or hay crops which are grown in an extensive way. Even on soils which originally had good stores of potash, and which may even yet contain plenty of available potash in the subsoil, potash should be used in fertilizers to start the crop.

Only the rich overflow bottom lands and some yellow clay hillsides require no potash.

Potash is, of course, not the only element that may be needed on the soils we have discussed. Phosphate, nitrogen, and lime are also important. As a matter of fact, potash generally gives greater returns when used in addition to lime and other fertilizer elements than when it is used alone.

Kainit Controls Weeds

(*From page 27*)

Some three weeks later when we made our third hoeing on the balance of the patch, we again did not have to hoe these nine rows, although there were a few weeds coming up in the three rows which received only the 50 lbs. per row. As the summer went on, a few more weeds grew in these three rows, and an odd one came up in the other six rows, but none of them were hoed at any time and they were the cleanest rows in the patch in the fall. As mentioned before, the hoeing cost us from 30c to 50c per row each time over, or a total of about $30.00 per acre.

If kainit cost us $16 per ton it would be approximately the same as if we had applied salt, for while the kainit cost a little more than the salt, it required a little less per acre to accomplish the same results. The kainit, however, contains 14 per cent available potash and so has a fertilizer value in addition to that of weed-killer. We have been applying a mixed fertilizer, 5-12-8, at the rate of one ton per acre. The potash has been costing us

about $1 per unit, and so the total cost of potash has been $8 per acre. On these nine rows to which the kainit was applied, we left out the potash in the fertilizer application. The first three rows received about the same potash application as usual, while the second three received twice as much, and the third three, three times as much. Of course it was not spread over the whole surface of the ground, and so the actual fertilizer value can only be told by further tests.

We realize that this is only a one-year test, but we are so interested in it that we intend to treat six acres of asparagus this year at the rate of one ton per acre.

Arrowhead Potato Tests Show Extra Bushels from Potash Cost 7½ cents Each

By Mark J. Thompson

Director Northeast Minnesota Experiment Station, Duluth, Minnesota

THE "Arrowhead" designates the western or Minnesota portion of that great conifer area which covers northern Minnesota, Wisconsin, and Michigan and borders the southern and western shores of Lake Superior.

In 1924 the St. Louis County, Minnesota, Club made a cooperative pact with the Northeast Minnesota Experiment Station to conduct crops and soils tests in various parts of the county which, by the way, is almost as large as Massachusetts. The object was to recheck the findings of the Station and determine their application in remote districts. The work has continued through the years and now includes Lake county as well.

We are concerned here with the comparative results obtained during 1931 on 10 St. Louis and Lake county fields where potash fertilizer was used on potatoes. The fields were located as follows: Lind Field, Forbes; Ball Field, Chisholm; Spikberg Field, Grand Lake; Lake County Field, Two Harbors; Carlson Field, Gheen; Mobroten Field, Forbes; Kirschir Field, Forbes; Erickson Field, Gilbert; Sarich Field, Gilbert; and Nelson Field at Cook.

TABLE I

Acre Yields; St. Louis—Lake County Potato Tests; 1931

Management	Acre Yields all soils	Hill Yields all soils
Check	208.6 bus.	1.35 lbs.
220 lbs. Sul. Amm. Per. A.	240.8 "	1.535 "
220 " (8-16-12) " "	254.8 "	1.57 "
220 " Treb. Superphos. "	259.17 "	1.71 "
220 " Mur. Potash " "	272.63 "	1.83 "
440 " (4-8-6) " "	235.52 "	1.68 "
660 " (4-8-6) " "	262.6 "	1.82 "
880 " (4-8-6) " "	257.85 "	1.81 "

TABLE II

Potash Studies; Sand and Clay Loam Soils; 1931

Location	Soil Type	Check	Acre Yields in Bus. 220 lbs. Muriate Potash per Acre	Increase
Forbes (1)	Sandy loam	166.	253.9	87.9 bus.
Forbes (2)	" "	174.3	220.1	45.8 "
Forbes (3)	" "	215.61	279.6	64. "
Grand Lake	" "	201.6	221.6	20. "
Gilbert	" "	301.5	421.1	119.6 "
Two Harbors (4)	Clay loam	203.2	232.2	29. "
Two Harbors (5)	" "	165.2	285.6	120.4 "
Gheen	" "	220.5	300.9	80.4 "

(1) Fertilizer placed at bottom of drill row. (2) Fertilizer spread over surface of the soil; (3) Kirschir farm test; (4) Irish Cobblers; (5) Green Mountains.

The data presented in table I show that potash fertilizer made the heaviest average hills and the largest total yield.

Potash Proved Profitable on Both Soil Types

Several additional points of interest are developed when the results from untreated or check plots are compared with those from the potash plots with particular reference to soil type, table II.

Average Gain Was 72 Bushels

Considering all soils and all treatments, the largest average production both per field and per hill was realized when 220 pounds muriate of potash per acre were used, the average gain being 72 bushels per acre over check and ranging from 20 bushels to 120 bushels per acre.

Extra Bushels Cost 7½ and 11 Cents

Just what did these additional bushels cost? Naturally, it varied with the treatment, as we see by the next table.

The cheapest gain on both soil types resulted from applying 220 pounds of muriate of potash; on sandy loam the increased bushels cost 7.49 cents each, while on clay loam, the increased bushels resulting from the potash treatment cost 11.1 cents each.

The fields used were widely scattered and represent prevailing farm types of soil under cultivation in this great area. We expect to repeat and recheck this work during the 1932 growing season.

TABLE III

Acre Increase and Cost per Bushel—All Fertilizer Treatments

Management	Sandy Loam Soil Increase in Acre Yields	Sandy Loam Soil Cost per Bushel of Increase	Clay Loam Soil Increase in Acre Yields	Clay Loam Soil Cost per Bushel of Increase
220 lbs. Sul. Amm. per A.	47.82 bus.	8.05c.	16.59 bus.	23.2c.
220 lbs. (8-16-12) " "	48.20 "	16.2c.	44.20 "	17.7c.
220 lbs. Treb. Superph. " "	64.27 "	8.55c.	36.88 "	14.9c.
220 lbs. Mur. Potash " "	76.49 "	7.49c.	51.58 "	11.1c.
440 lbs. (4-8-6) " "	29.83 "	29.5c.	24.02 "	36.6c.
660 lbs. (4-8-6) " "	53.83 "	24.5c.	58.28 "	22.6c.
880 lbs. (4-8-6) " "	70.45 "	24.9c.	43.43 "	40.5c.

Complete Fertilizers for Orchards

(*From page* 11)

This need for a more adequate orchard mulch, whether it be through a sod system or whether it be supplied through legume or non-legume crops, is one of grave importance to many New England growers as well as to growers in other parts of the country. Past methods of treatment have continued to burn out the supply of organic matter until in many orchards a non-fertile condition exists. Some growers already have sensed the trouble they have been running into and are attempting to overcome the difficulty. They are meeting with success.

Professor A. J. Farley of the New Jersey Agricultural Experiment Station, speaking at Hartford at the Connecticut Pomological meetings recently, stressed the importance of a more suitable orchard soil condition. As an example he pointed out the two fruit-growing counties in New Jersey, Burlington and Monmouth counties. One of them has been following a straight nitrogen program for years; the other has been using complete fertilizer. The nitrogen-alone growers are running into difficulty with a soil that has become very sour, erodes easily, and will barely grow the most meagre of grasses. This condition is also directly affecting the yield and tree vigor. The complete-fertilizer users, on the other hand, are not having this soil difficulty; and while it is costing them more, they will eventually win out over the other group. Soils in both counties are comparable as to general make-up.

Professor R. D. Anthony, at Pennsylvania State College, is also meeting with decided success in his orchard work in showing the value of plenty of organic matter.

In a recent discussion of "Organic Matter in the Orchard" by Dr. E. C. Auchter, Principal Horticulturist of the U. S. Department of Agriculture, we find:

"The important thing is to grow a heavy sod so that the large amounts of organic matter can be cut twice a year and left on the ground to improve the soil. In the case of cultivated orchards, the object should be to plow under heavy cover crops yearly." In both practices, according to Dr. Auchter, "a lime test should be made and lime and fertilizer should be added if these are necessary in order to produce a heavy cover crop. Nitrogen, phosphorus, and potassium will probably all have to be added on many soils to get a heavy growth of cover crops."

As stated previously, those growers in New England, who have seen the handwriting on the wall, are now growing adequate cover crops and are maintaining orchard soil conditions that are sufficient to meet the demands of heavy yields, constant tree feeding, and drought. Whether they are growing heavier sods or whether they are growing legume crops, they are seeing to it that there is a sufficient supply of phosphorus and potash along with the nitrogen. It is believed that the foregoing tests would have shown even greater differences had they been carried out under legume sod conditions.

NEW POTATO

Plant beeeders of the United States Department of Agriculture have originated a new variety of potato that resists the disease known as mild mosaic. This new potato is the Katahdin. The department tested it in 100 localities in 20 States last year and it showed no signs of mosaic, although other varieties growing in the same fields became affected with the disease. "Mild" mosaic is not a mild disease but causes severe damage to the potato crop.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, and Crops. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

Potatoes have such an important place as a food that their quality goes far to determine the quality of the meal of which they are a part. The work of M. Whittemore and B. M. Kuschke in investigating the factors which influence the cooking quality of potatoes is, therefore, of particular importance, especially since comparatively little has been published on this subject. The authors describe their experiments in Bulletin 231 of the Rhode Island Agricultural Experiment Station entitled, "Certain Relationships of Potash Fertilization and Varieties of Potatoes to Table Value."

Over a period of five years, the authors cooked potatoes from plots which received high and low amounts of potash. Potatoes from each plot were boiled, mashed, and baked each year, and members of the station staff judged whether high or low potash lots were superior. In the case of the boiled and baked potatoes, the judgments were overwhelmingly in favor of high-potash potatoes. With the mashed potatoes, the high-potash lots always received more first places, but the difference was not so great. The authors believe this may have been due to a combination of circumstances among which is the fact that mashed potatoes have other substances added to them, changing their texture and flavor and making the difference between the potatoes hard to detect.

Starch in the potatoes from the high and low-potash plots was determined and variable results were obtained. There seemed to be no definite correlation in this experiment between the starch content and the mealiness of the potatoes. Nitrogen was slightly but consistently lower in the high-potash treated potatoes.

The influence of variety on cooking quality was also investigated. For this work, Green Mountain, Rural Russet, and Irish Cobbler potatoes were used over a period of three years. There were no outstanding differences among the varieties in either cooking quality or starch content.

Summarizing and analyzing five years' experiments on "Celery Fertilizer Experiments in Ohio," D. Comin finds that the equivalent of at least one ton per acre of 2-8-16 fertilizer should be used to get the most profitable yields. The work was conducted on a recently broken muck soil and the data obtained naturally pertain primarily to similar soils. When 1,000 pounds per acre of 2-8-16 were used, the yield was not as high as when one ton was used. Common salt did not increase the yield. Barnyard manure increased the yield, but the same amount of mineral nutrients applied as a fertilizer gave a higher yield than the manure. Celery growers on muck soil will find these experiments, described in Ohio Agricultural Experiment Station Bulletin 493, to be of value and interest. The work is described in a practical, and to a large extent non-technical, manner that makes the bulletin useful to the practical as well as to the scientific man.

Raspberry growers who are wonder-

ing how they ought to fertilize this crop will find excellent help in "The Fertilization of Red Raspberries," by A. E. Stene, Rhode Island Agricultural Experiment Station Bulletin 229. Recommendations of various experiment stations are summarized, followed by the results of three years' experiments conducted by the author. A basic annual treatment of 500 pounds per acre of 4-10-6 was used. Compared with this were three other plots with one of the three fertilizer elements missing on each. Four varieties, the Latham, June, Herbert, and Cuthbert, were grown on each plot. The highest yields were obtained with a complete fertilizer. Leaving out one of the fertilizer elements depressed the yield in each case, the greatest depression occurring when potash was omitted from the fertilizer. These results show that a complete fertilizer was needed for red raspberries under the conditions of this experiment and that in this fertilizer, the potash is the most important constituent. The author feels that the amount of fertilizer used probably was not sufficient to produce the most profitable yields.

Cane growth measurements gave the same relative results as the yields.

Lime was not thoroughly tested, but as used, gave large increases in yield. The author believes that red raspberries do best on a soil that is not very acid. Black raspberries seemed to be less particular in this respect.

Considering the varieties, the Latham outyielded by far the other three varieties. The June variety was earliest and had the second highest yield, but was far behind the Latham in this respect. The Herbert had the lowest yield. The author believes the Latham is an exceptionally good variety, taking all factors into consideration.

"Commercial Fertilizers, Report for 1931," *Agr. Exp. Sta., New Haven, Conn., Bul.* 331, *Oct.*, 1931, *E. M. Bailey.*

"Commercial Fertilizers Inspected and Analyzed in the State of Georgia, Year 1931," *Ga. Dept. of Agr., Atlanta, Ga., Serial No.* 120, *Eugene Talmadge.*

"Report of Analyses of Commercial Fertilizers," La. Dept. of Agr. & Immigration, Baton Rouge, La., Fert. Rept., Season 1930-1931, *Harry D. Wilson.*

"Commercial Fertilizers, 1931," *Agr. Exp. Sta., Orono, Me., Off. Inspections* 141, *James M. Bartlett.*

"Commercial Fertilizers, Commercial Feeds, and Agricultural Liming Materials," Univ. of Md., Col. Park, Md., Control Series No. 141, *Nov.*, 1931.

"Fertilizer Analyses and Registrations, 1931," *Dept. of Agr., Dairy and Food, St. Paul, Minn., H. A. Halvorson.*

"The Use of High Analysis Fertilizers," Agr. Ext. Serv., Col. of Agr., Columbia, Mo., Cir. 278, *Aug.*, 1931, *Lloyd M. Turk.*

"The Use of Ammonia and Nitrate Nitrogen by Certain Crop Plants," Agr. Exp. Sta., New Brunswick, N. J., Bul. 526, *Sept.*, 1931, *V. A. Tiedjens and W. R. Robbins.*

"Report of Analyses of Commercial Fertilizers Sold in New York State, July 1, 1930, *to June* 30, 1931," *Dept. of Agr. & Markets, Albany, N. Y., Agr. Bul.* 255, *Oct.*, 1931.

"Inspection of Fertilizers," Agr. Exp. Sta., Kingston, R. I., Ann. Fert. Cir., Sept., 1931, *W. L. Adams, D. R. Willard, and A. S. Knowles, Jr.*

"Observations on the Use of Commercial Fertilizers on the Arid Soils of Utah," Agr. Exp. Sta., Logan, Utah, Bul. 233, *Jan.*, 1932, *D. W. Pittman and Clarence Burnham.*

"Fertilizers for Cotton Soils," U. S. D. A., Washington, D. C., Misc. Pub. 126, *Nov.*, 1931, *J. J. Skinner.*

Soils

A further contribution in the search for a short, rapid, and reasonably accurate method for determining the fertilizer needs of a soil has been made by W. G. Sackett and L. C. Stewart. They have adapted a method suggested by Winogradsky in which the relative growth of an organism in the soil is used to measure the soil's fertilizer requirements. The method briefly consists of taking a soil sample, adding starch or sugar and sufficient moisture to make a kind of mud pie, placing it in a warm room for three days and observing the amount of growth made on the surface of the soil by an organism known as Azotobacter. This organism occurs naturally in most soils that are not acid but can easily be added in the laboratory, when it is not present. If a good

growth of the organism results, which will give the surface of the soil a fuzzy or "moldy" appearance, it shows that the soil will grow a crop so far as the mineral nutrients are concerned. In case a good growth of the organism does not occur, appropriate lime, phosphate, and potash compounds are added until good growth is obtained. These additions correspond to fertilizer additions necessary to obtain a good crop.

This test is naturally based on the assumption that the mineral nutrient requirements of Azotobacter are similar to those of growing crops. This appears to be the case, since good correlations have been obtained between results with this test and actual field trials. The authors describe their test in detail and show results obtained with it in Bulletin 375 of the Colorado Agricultural Experiment Station entitled, "A Bacteriological Method for Determining Mineral Soil Deficiencies by the Use of the Soil Plaque."

"Phosphate Solubility Studies on Some Unproductive Calcareous Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 35, Oct. 15, 1931, W. T. McGeorge and J. F. Breazeale.

"The Relation of Phosphate Availability, Soil Permeability, and Carbon Dioxide to the Fertility of Calcareous Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 36, Nov. 1, 1931, W. T. McGeorge and J. F. Breazeale.

"Effect of Hydrogen-ion Concentration on the Growth of Strawberries in Sand and in Soil," Agr. Exp. Sta., Lexington, Ky., Bul. 321, Sept., 1931, C. S. Waltman.

"Estimation of Nitric and Nitrous Nitrogen in Soils," Agr. Exp. Sta., Col. Sta., Tex., Bul. 439, Nov., 1931, G. S. Fraps and A. J. Sterges.

"Report of Analyses of Samples of Lime Materials Used for Agricultural Purposes Sold in New York State, July 1, 1930, to June 30, 1931," Dept. of Agr. & Markets, Albany, N. Y., Agr. Bul. 256, Nov., 1931.

"Soil Survey of Calvert County, Maryland," U. S. D. A., Washington, D. C., Series 1928, No. 13, S. O. Perkins and Merle Hershberger.

"Soil Survey of Mecosta County, Michigan," U. S. D. A., Washington, D. C., Series 1927, No. 18, Robert Wildermuth and J. F. Fonder.

"Soil Survey of Jackson County, Mississippi," U. S. D. A., Washington, D. C., Series 1927, No. 19, J. Ambrose Elwell, A. W. Goke, W. J. Moran, E. Malcolm Jones, and E. P. Lowe.

"Soil Survey of Pierce County, Nebraska," U. S. D. A., Washington, D. C., Series 1928, No. 9, A. W. Goke and W. H. Buckhannan.

"Soil Survey of York County, Nebraska," U. S. D. A., Washington, D. C., Series 1928, No. 10, F. A. Hayes and A. W. Goke.

"Soil Survey of Thayer County, Nebraska," U. S. D. A., Washington, D. C., Series 1927, No. 20, E. A. Nieschmidt, R. H. Lovald, R. L. Gemmell, and R. C. Roberts.

"Soil Survey of Belmont County, Ohio," U. S. D. A., Washington, D. C., Series 1927, No. 17, S. W. Phillips, Ralph Blaney, George Drewes, Jr., A. H. Paschall, and J. G. Steele.

Crops

Eleven annual reports, including the Report of the Secretary of Agriculture for 1931, have come into circulation during the time elapsed since our last issue. These reports, to be found listed below, are certain to prove of special interest to all agriculturists within the respective States and in many instances of interest to workers in various other sections of the country. The annual report of an agricultural college and experiment station is a very valuable summary of the State's agricultural activities and consequently an important reference for any agricultural activity.

"Forty-second Annual Report, Fiscal Year Ending June 30, 1931," Agr. Exp. Sta., Auburn, Ala., M. J. Funchess.

"Studies in Lettuce Seedbed Irrigation Under High Temperature Conditions," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 33, Sept. 1, 1931, M. F. Wharton and Charles Hobart.

"Forty-third Annual Report, Fiscal Year Ending June 30, 1931," Agr. Exp. Sta., Fayetteville, Ark., Bul. 268, Nov., 1931, Dan T. Gray.

"Pruning and Thinning Experiments With Grapes," Agr. Exp. Sta., Berkeley, Cal., Bul. 519, Nov., 1931, A. J. Winkler.

"The Forty-fourth Annual Report of the Colorado Agricultural Experiment Station for the Fiscal Year 1930-31," Agr. Exp. Sta., Fort Collins, Colo., C. P. Gillette.

"Annual Report of the Director for the Fiscal Year Ending June 30, 1931," Agr. Exp. Sta., Newark, Del., Bul. 172, Nov., 1931, C. A. McCue.

"Development of Strains of Cigar Wrapper Tobacco Resistant to Blackshank," Agr. Exp. Sta., Gainesville, Fla., Bul. 226, Mar., 1931, W. B. Tisdale.

"A Year's Progress in Solving Farm Problems of Illinois, 1930-31," Agr. Exp. Sta., Urbana, Ill., H. W. Mumford.

"Comparison of Apparently Healthy Strains and Tuber Lines of Potatoes," Agr. Exp. Sta.,

Orono, Me., Bul. 358, July, 1931, Donald Folsom, F. V. Owen, and Hugh B. Smith.

"Corn Silage Production," Agr. Exp. Sta., Col. Park, Md., Bul. 329, Oct., 1931, J. E. Metzger and R. L. Sellman.

"Flower Pot Composition and Its Effect on Plant Growth," Agr. Exp. Sta., Amherst, Mass. Bul. 277, Oct., 1931, Linus H. Jones.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XIV, No. 2, Nov., 1931.

"Planning for the Future of Montana Agriculture," Agr. Exp. Sta., Bozeman, Mont., 37th Ann. Rept., July 1, 1929, to June 30, 1930, F. B. Linfield.

"Development and Ripening of Peaches as Correlated with Physical Characteristics, Chemical Composition, and Histological Structure of the Fruit Flesh: I. Physical Measurements of Growth and Flesh Texture in Relation to the Market and Edible Qualities of the Fruit," Agr. Exp. Sta., New Brunswick, N. J., Bul. 525, Sept., 1931, M. A. Blake, O. W. Davidson, R. M. Addoms, and G. T. Nightingale.

"Fiftieth Annual Report for the Fiscal Year Ended June 30, 1931," Agr. Exp. Sta., Geneva, N. Y., U. P. Hedrick.

"Correlation Studies of the Growth of Apple and Cherry Trees in the Nursery from the Seedling to the Two-year Budded Tree," Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 185, Oct., 1931, H. B. Tukey and Karl D. Brase.

"Approved Practices for Irish Potato Growers," Agr. Exp. Sta., State Col. Sta., Raleigh, N. C., Bul. 279, Jan., 1932, B. F. Fulton, H. B. Mann, R. F. Poole, and R. Schmidt.

"North Carolina Farm Program—Eastern Section," Agr. Ext. Serv., State Col. Sta., Raleigh, N. C., Ext. Cir. 190, Jan., 1932.

"North Carolina Farm Program—Western Section," Agr. Ext. Serv., State Col. Sta., Raleigh, N. C., Ext. Cir. 191, Jan., 1932.

"Flax Production in Argentina," Agr. Exp. Sta., Fargo, N. D., Bul. 253, Dec., 1931, H. L. Bolley.

"Life History and Composition of the Soybean Plant," Agr. Exp. Sta., Wooster, Ohio, Bul. 494, Nov., 1931, H. L. Borst and L. E. Thatcher.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, No. 154, Jan.-Feb., 1932.

"Forty-fourth Annual Report of the South Carolina Experiment Station of Clemson Agricultural College for the Year Ended June 30, 1931," Clemson Agr. Col., Clemson Col., S. C., Dec., 1931, H. W. Barre.

"Annual Report of the Virginia Polytechnic Institute, Agricultural Experiment Station, for the Period July 1, 1927, to June 30, 1931," Agr. Exp. Sta., Blacksburg, Va., A. W. Drinkard, Jr.

"Virginia Department of Agriculture and Immigration," Richmond, Va., Bul. 289, Jan., 1932.

"Department of Agriculture and Immigration of Virginia," Richmond, Va., Bul. 288, Dec., 1931.

"Soybean Culture and Varieties," Agr. Exp. Sta., Morgantown, W. Va., Bul. 243, Sept., 1931, M. M. Hoover, T. C. McIlvaine, and R. J. Garber.

"Report of the West Virginia Agricultural Experiment Station for the Biennium Ending June 30, 1930," Agr. Exp. Sta., Morgantown, W. Va., Bul. 244, Nov., 1931, F. D. Fromme.

"Report of the Secretary of Agriculture, 1931," U. S. D. A., Washington, D. C.

"Report of the Chief of the Bureau of Plant Industry," U. S. D. A., Washington, D. C., Wm. A. Taylor.

"Shortleaf Pine," U. S. D. A., Washington, D. C., Farmers' Bul. 1671, Sept., 1931, Wilbur R. Mattoon.

"The Farm Garden," U. S. D. A., Washington, D. C., Farmers' Bul. 1673, Oct., 1931, J. H. Beattie and W. R. Beattie.

"Pop Corn," U. S. D. A., Washington, D. C., Farmers' Bul. 1679, Oct., 1931, Arthur M. Brunson and Carl W. Bower.

"Methods of Crop Production at the Colby, Kans., Branch Experiment Station, 1915 to 1929," U. S. D. A., Washington, D. C., Cir. 184, Sept., 1931, Joseph B. Kuska.

"Sisal and Henequen, Plants Yielding Fiber for Binder Twine," U. S. D. A., Washington, D. C., Cir. 186, Oct., 1931, Lyster H. Dewey.

"Time of Planting as Affecting Yields of Rural New Yorker and Triumph Potatoes in the Greeley, Colo., District," U. S. D. A., Washington, D. C., Cir. 191, Oct., 1931, W. C. Edmundson.

Economics

For the large number of our readers who like to have their facts supported by figures and graphs, "A Graphic Summary of American Agriculture Based Largely on the Census," compiled by O. E. Baker, Senior Agricultural Economist, recently put into circulation by the U. S. Department of Agriculture as Miscellaneous Publication No. 105, will prove of great interest. The first sentence of the publication, "The decade since the World War has been in many ways the most extraordinary period in American Agriculture," arrests the reader's attention. Extensive and significant shifts have occurred in the areas of crop and livestock production since the prewar years and even since the World War, the author points out. The serious agricultural situation that has developed since the World War

suggests that greater attention be given than heretofore to presenting the more purely economic and social aspects of agriculture. Therefore, considerable space has been devoted to such subjects. The publication should be of especial value to all schools teaching agriculture.

"Cost of Producing Field Crops in the Salt River Valley, Arizona, 1928," Agr. Exp. Sta., Tucson, Ariz., Bul. 139, Oct. 1, 1931, S. P. Clark.

"Alfalfa," Agr. Exp. Sta., Berkeley, Cal., Bul. 521, Dec., 1931, E. W. Braun.

"Georgia Agricultural Outlook for 1932," Ext. Div., State Col. of Agr., Athens, Ga., Vol. XX, No. 417, Dec., 1931, Kenneth Treanor.

"Management Factors That Influence Farm Profits in Southwest Illinois," Agr. Exp. Sta., Urbana, Ill., Bul. 374, Oct., 1931, R. H. Wilcox, C. W. Crickman, and R. G. Trummel.

"Organization and Management Problems of Cooperative Strawberry Marketing Associations in Kentucky," Agr. Exp. Sta., Lexington, Ky., Bul. 319, Aug., 1931, C. D. Phillips and D. G. Card.

"Consumer Preferences for Potatoes," Agr. Exp. Sta., Durham, N. H., Cir. 37, June, 1931, E. H. Rinear.

"Production of Crops and Livestock on the Newlands Project, 1930," Agr. Exp. Sta., Reno, Nev., Bul. 123, Sept., 1931, F. B. Headley and Cruz Venstrom.

"A Study of the Organization and Management of Rhode Island Farms," Agr. Exp. Sta., Kingston, R. I., Bul. 230, Sept., 1931, J. L. Tennant.

"Local Rural Leaders in Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 257, Sept., 1931, Harvey W. Starling and Fred R. Yoder.

"Corn Futures, Volume of Trading, Open Commitments and Prices, from January 3, 1921, to December 31, 1929," U. S. D. A., Washington, D. C., Stat. Bul. 34, Oct., 1931.

"Timely Economic Information for Washington Farmers," State Col. of Wash., Spokane, Wash., No. 2, Dec., 1931.

"The Agricultural Outlook for the Southern States, 1931-32," U. S. D. A., Washington, D. C., Misc. Pub. 137, Dec., 1931.

The Use of Potash Aids in Reducing Diseases and in Producing Quality Crops

(*From page* 8)

was a marked improvement in the quality of the berries as the percentage of the potash was increased up to 6 per cent in the mixture.

With the strawberry crop of 1931 receiving 1,500 pounds of fertilizer mixture per acre, 750 pounds in November 1930 when the plants were set and 750 pounds in January 1931, the berries which received a mixture containing 4 per cent ammonia, 8 per cent available phosphoric acid, and 6 per cent potash showed 55 per cent of the berries were firm after standing in the crates for three days after picking. Those which had received an application of a mixture containing 4 per cent ammonia, 8 per cent available phosphoric acid, and no potash only had 30 per cent of the berries firm after a 3-day standing interval. In other words, the spoilage in the latter case was 1.56 times what it was where 6 per cent of potash was used in the fertilizer mixture.

In some general field experiments with soybeans on Norfolk sandy loam near Chadbourn in 1931 in cooperation with the Federal Bureau of Chemistry and Soils, it was found that the use of 25 pounds of potash per acre in the form of sulphate of potash had a remarkably favorable effect upon the growth of the beans and the size and filling out of the pods. For the past 20 years this land used in the experiment had been run in corn, soybeans, and cowpeas and had had but little other than nitrate of soda added to it annually. The addition of this 25 pounds of potash, it is estimated, more than tripled the yield of hay and the filling out of the pods and the size of the beans in the pod, as will be seen by the accompanying cut. The untreated beans were small and imperfect in size and very inferior in grade.

Potato Profits in Arkansas

(*From page* 13)

2. Use 100 pounds of commercial fertilizer, rich in potash to each bushel of seed potatoes planted. Apply the fertilizer in the center furrow, mix well with the dirt, and then cover lightly before planting potatoes.

3. Plant Nebraska State certified seed.

4. Cut the seed into large pieces, the size depending on the cost of the seed. The cheaper the cost of seed, the larger one can afford to cut the seed. Pieces should be cut in from two to four pieces and never smaller.

5. Market through the cooperative marketing association.

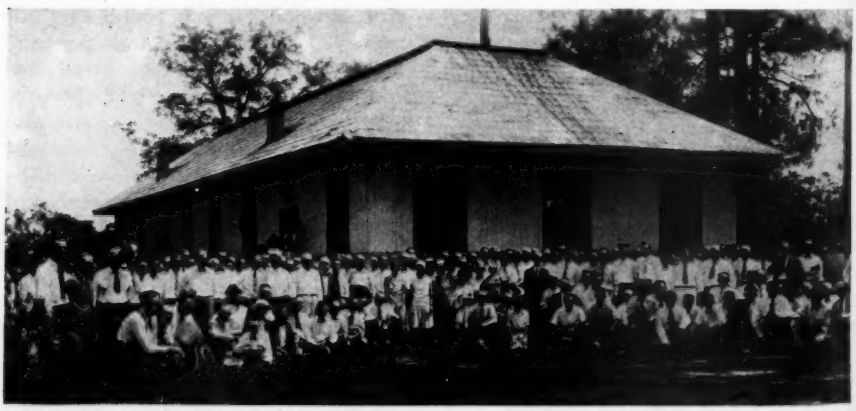
South Carolina Asparagus

(*From page* 26)

ing 160 pounds of actual potash per acre, which was the amount he thought necessary, yet he knew this quantity was not bringing satisfactory yields. In this field he selected a uniform acre with a check on either side. To this acre he applied 500 pounds of 20 per cent high-grade kainit. The following spring Mr. Cave cut 109 more bunches from the acre receiving the kainit than he did from the check acre. He also reported that the percentage of colossal "grass" was much higher than was produced on the field receiving only the complete fertilizer.

The following cutting season Mr. Cave was so enthusiastic about the results he obtained by using potash that he applied 500 pounds of muriate to this same acre in addition to the regular fertilizer. The following cutting season he harvested 196 more bunches from the acre receiving the muriate than he did from the check acres. More than 50 per cent of the "grass" was colossal, which was far above the field average.

Mr. Fulmer's experience was quite similar, except he had a greater handicap in the beginning. Mr. Fulmer purchased a farm on which there was a field of six-year-old asparagus. It had been neglected from the very start and was in poor condition. Mr. Fulmer fertilized his field before the cutting season with 800 pounds of a 3-6-7 (NPK). In the middle of the



At the meeting of the South Carolina asparagus growers at the Aiken County Agricultural Club, 75% of the South Carolina asparagus acreage was represented. The growers found that fertilizer carrying 8% potash gave an average of 12 crates more than fertilizer carrying 5%.

field, he selected a uniform acre to which he added 400 lbs. of muriate and left a check acre on either side. After the cutting season was over, he applied 1,200 pounds of 6-4-5 to the entire field. His harvest records show that he cut 123 more bunches from the potash acre than he did from the check and 59 per cent of the "grass" from this acre graded colossal. The field receiving only the regular fertilizer showed a much smaller percentage of colossal "grass."

The trend toward greater yields of better "grass" is well under way in South Carolina. In a short time growers, by maintaining their high standard of quality and lifting their yields, undoubtedly will place asparagus in the lead as one of South Carolina's most dependable and profitable truck crops.

Spending for Profits

(*From page* 30)

fertilizer per acre. Cotton is not so much a specialized crop, yet the cotton farmer uses in the aggregate large amounts of fertilizers. In the western half of the United States, comparatively little fertilizer is used. California uses the most, largely on the citrus and other fruit and truck crops. Citrus farmers not uncommonly spend more than $100 per acre to grow the best citrus fruits. In Oregon and Washington fertilizer is largely confined to such centers of fruit production as Hood River and Wenatchee. Most of the arid West uses practically no fertilizer.

Asked why he fertilized so liberally, a citrus grower in California replied, "A high yield of first quality fruit is so important, I cannot afford to do otherwise. I will take no chances on an impoverished soil."

"But isn't there already overproduction of citrus fruits?"

"Yes, of a certain quality," he replied. "Just as is true of many other crops, there are many acres of citrus land that should never have been planted. They are not profitable now and never will be. It is the production of culls and low-grade stuff, grown at a loss, that is causing overproduction, and low markets."

And what is true of citrus is true also of apples, pears, potatoes, cotton, walnuts, and many other crops—too large an acreage, and poor land poorly farmed. Only the exceptional farmer can show a profit under the keenly competitive conditions of the present.

Crops which produce large acre returns will always receive correspondingly large applications of fertilizers. Under normal conditions $30 worth of grain or $300 worth of potatoes are equally reasonable yields. Some crops yield $1,000 and more an acre. A teacher in agriculture used to say that 10 per cent of the expected gross receipts from the crop was all one should spend for fertilizing that crop. Applying this rather crude rule, one could use $30 in fertilizing potatoes as readily as $3 in fertilizing grain.

However, a rigid rule is never followed in fertilizing any crop. Profit in the crop is what the grower wants, whether it takes much or little fertilizer to obtain it. On the average, farmers in this country underfertilize and overexpand acreage. European countries use more fertilizer, and produce bigger crop yields than we do. In proportion to acreage, England uses three times, France four, Germany ten, and Holland twenty times as much fertilizer as is used in this country. European farmers often have a much better system of crop rotation and a better diversification of crops than are found on the average American farm. It is the opinion of those who have given the problem study that much of our poorer land should be devoted to non-competitive crops such as timber, and another portion should

be devoted to soil-building crops. Such a crop distribution would help eliminate marginal and submarginal lands and reduce the acreage of crops now overproduced.

Those farmers who are making money, in the face of the present depression, produce large yields and handle their products economically. The largest cost item of producing most farm crops is the labor. A fertile soil and the use of fertilizer to increase crop yields reduce the labor cost. Studies in Ohio showed that in producing 40 bushels of corn per acre, only 2 bushels were left for profit, while the production of 65 bushels an acre left 18 bushels for profit. In Virginia a study of tobacco production showed a yield of 500 pounds an acre without fertilizer and the profit was $12. With 1,400 pounds of complete fertilizer, the yield increased to 934 pounds and the profit to $135. Producing big crops is a poor way to "go broke."

Good Soils Respond Best

As a farm demonstrator recently stated, "it may be easy to show a big percentage increase from the use of fertilizer on the poorest land, but 'darned' hard to show profitable production." Nearly always there is more net profit in fertilizing the best fields on the farm. The Michigan Experiment Station reports that especially do lands well supplied with organic matter respond well. In growing sugar beets it was found that the best lands could be profitably fertilized at 30 to 50 per cent heavier rates or up to 1,000 pounds per acre of high-grade fertilizer. This is a forceful argument for the elimination of the poorer land from the production of highly competitive crops. Better devote the poor land to soil-building legumes and grasses, until such time as it is more urgently needed, and in condition to respond more profitably to cultural treatments.

Poor lands left to grass and legumes automatically increase their supply of organic matter. Whatever grazing may be obtained may be looked upon as so much help toward taxes. When the improvement is sufficient or they are again needed for crops, these lands temporarily withdrawn from tillage may again be brought under cultivation. A preliminary course of liming and leguming may be needed to render the more exhausted lands responsive.

In contrast to the condition of soils too poor to respond well to fertilizer, Thorne, in Ohio, has shown that for those soils that are naturally productive, and where crop rotation is practiced, mineral fertilizers have been more satisfactory than stable manure when used in equivalent amounts. Similar results, covering a period of three-quarters of a century, are reported from Rothamsted, England, indicating that mineral fertilizers on good, well-managed land are continuously profitable and efficient.

Use Liberally for Profit

A mathematically minded agriculturist brings out the fact that it is not per cent increase, or per cent profit, but dollars per acre profit that count. Says he, "it is dollars and not per cent that afford the farmer his living and bankable surplus." A 20 per cent return on $50 per acre invested in fertilizers is better than 100 per cent when only five dollars are invested. A North Carolina study indicated that 200 pounds of fertilizer an acre on cotton gave the highest per cent on the dollar, but 1,000 pounds gave the highest returns per acre.

That liberal fertilization is profitable has been fully demonstrated. The Mississippi Station has shown that 600 pounds per acre on cotton when prices were reasonable produced an annual net profit for three years of more than $32 an acre. Doubling the rate of fertilization increased the net to nearly $50, but trebling the rate increased the net to more than $57 an acre. When the rate was quadrupled, the net was somewhat reduced, indicating

that the profitable limit had been reached.

The use of fertilizer is constantly extending to a larger range of crops. It has recently been shown that pastures can be profitably fertilized. At a cost of $10.50 annually for lime and complete fertilizers in Pennsylvania, pasture was made sufficiently productive to take the place of $44 worth of feed per acre.

It is sometimes necessary to fertilize very liberally before any returns are shown. Sugar planters in Hawaii received no benefit from 300 pounds of potash an acre, but with a ton or more, very phenomenal returns were obtained. Past experience indicates that in general it should prove profitable to fertilize both more universally and more liberally than is now common practice.

In times like the present, more than ordinary vigilance is needed to insure a reasonable profit margin. No available means for stimulating better returns can safely be overlooked. The right fertilizer properly used has proved itself in the past. The best profits have always come to those who have been able to produce the largest yields most economically.

Common Sense About Cotton

(*From page* 23)

This farmer saw that his old methods would not meet the situation. He realized that fewer acres must be made to work harder to produce his crop at lower cost. He picked out his eight best acres of cotton land and concentrated his usual three tons of well-balanced fertilizer on these eight acres. What was the result? He produced his usual 12 bales! With the help of the extra fertilizer, eight acres did the job of thirty.

The total cost of production for the eight acres was about half what it would have been for the thirty acres. The eight acres made a net profit of $249, while under the same conditions the 30 acres would have lost money. The 22 acres that were released from cotton were planted to corn, hay crops, and soybeans. A lot of good feed was produced and the soil was improved.

Throughout the South the thousands of farmers who have withstood the depressed conditions in the strongest manner are those who have adopted methods similar to these.

Others who are progressive enough to follow this course will be taking a big step toward developing a safe business proposition that will be hard to disrupt by a sudden decline in cotton prices. They will concentrate their cotton on their best land and highly fertilize it. They will release their thinner lands to the production of food and feed and to the growth of legumes to add nitrogen and humus to the soil.

How can the average Southern farmer make sure he is producing his 1932 cotton crop at the lowest possible cost per pound? He can purchase as much well-balanced fertilizer as his fertilizer money will buy. He can select his best cotton land and apply this fertilizer to it. Instead of decreasing his usual fertilizer application, he should increase it by at least 100 pounds per acre. When his cotton fertilizer gives out, he should stop planting cotton and put the remainder of his land into other crops.

This is the safest program for the average cotton farmer for 1932. Of course he will not have as many acres in cotton as usual. However, his best cotton land will be working hard for him producing more pounds per acre at a much lower cost per pound. His

prize crop will receive more of his personal attention in care and cultivation. He must play safe and insure a good crop, because he cannot hope for a repetition of the perfect weather conditions of 1931.

Thousands of fertilizer tests made by Experiment Stations and leading farmers conclusively prove that as the cotton yield per acre is increased the cost per pound is decreased. These tests show that 600 pounds of well-balanced fertilizer per acre increases the yield 600 to 800 pounds of seed cotton per acre. Well-fertilized cotton holds its own through good years and bad. Good fertilizer takes much of the gamble out of growing cotton.

There are two ways of meeting the demand for any agricultural product—by increasing the number of acres devoted to the crop or by increasing the acre yield. Southern farmers have generally met the demand for cotton by the first method. Twelve years of high cotton prices have caused many acres better suited to grain, legumes, pasture, and timber to be turned to cotton. Low cotton prices will bring these marginal acres back to their old crops and should cause cotton to be produced more efficiently and economically on lands best suited to its growth.

Not only farms but also farmers must meet the keen competition evidenced by low prices. Those willing to adopt progressive and efficient methods will be tempered by adverse conditions and emerge with a more successful and stabilized system. Those who are content with the old methods will find themselves swamped by production costs and will eventually be forced to seek other occupations.

The farmers who will produce the cotton of the future will be those who have learned to grow it at the lowest cost per pound. Progressive farmers, with excellent business foresight that sees beyond 1931, will start today to place themselves within this class.

Magnesium

(*From page* 20)

acidity naturally means a depletion of soil bases including magnesium. The large amounts of calcium sulfate added in the superphosphate used as a source of phosphorus has helped to increase the solubility of the magnesium compounds and thus favored the removal of magnesium both by cropping and leaching.

In some sections of the country, the lime used to correct soil acidity carries considerable quantities of magnesium, but in the potato growing areas of Maine, the comparatively small amounts of lime that are used happen to be particularly free of magnesium. The only other means of replenishing the magnesium losses has been the small additions of magnesium found as an impurity in fertilizers, especially in potash salts. With the increased use of concentrated fertilizers and the use of much purer potash salts in all brands of fertilizers, this source of supply has been reduced to a minimum.

These facts help to explain why a magnesium deficiency should appear and the results, though preliminary, seem to indicate that some magnesium will have to be added to our soils in the future. Further work needs to be done on this problem before any definite recommendation can be made as to the best source and optimum quantity of magnesium necessary. Until such information is obtained, it would seem advisable to use approximately 20 pounds of magnesium oxide per acre on the fields which have shown any magnesium deficiency symptoms in the past.

Tomato Production in the Northern Neck

(*From page* 22)

acre of a fertilizer analyzing from 3 to 5 per cent ammonia, 8 to 12 per cent phosphorus, and 5 to 10 per cent potash.

The chief varieties grown in this area are Stone, Marglobe, Norton, and Greater Baltimore. Since this section is in the wilt area, plantings to the wilt-resistant varieties, particularly Marglobe, are increasing. Most of the seed is purchased by the canners, who in turn dispose of it to the growers. This practice is ideal where the canner is sold on the importance and value of good seed. In some instances where the canner or grower prefers cheap seed to good seed, however, this practice works to the detriment of the growers and canners alike. One study in this area of fields of the Marglobe tomato produced from seed from different sources shows the following results:

Strain	Per Cent True Marglobe
1	98
2	75
3	35

The percentage true Marglobe was judged by the trueness to type of the fruit and the resistance of the plant to wilt. The grower using a strain showing only 35 per cent resistance to wilt is seriously handicapped. The extension service, working largely through the canners, has done much to introduce high-grade tomato seed into this area.

By far the majority of the growers produce their plants in the open plant bed. These beds are seeded from early April on. Seed is sown in rows 18 inches apart. Previous to seeding, the beds are given an application of from 500 to 1,000 pounds of a commercial fertilizer. These beds receive on the average four or five cultivations and are dusted from four to six times with a copper-lime-arsenate dust to control pests. Here, too, extension work can take much credit for the increased production of good plants in this area. Previous to plant bed demonstrations in this area, scarcely a pound of copper-lime-arsenate dust found its way into the Neck. With the spread of extension work, however, the sale of insecticides in this section has mounted by leaps and bounds.

Progressive growers determined the best fertilizer practice through farm experiments.

The plants are set in the field by hand from early May until the middle of June. Some few are planted even later. The peak of the planting takes place between May 20 and June 10. Planting distances vary considerably. Distance between rows varies from three to five feet while the distance between plants in the row ranges from two and one-half to four feet. General recommendations for this area are three by five feet.

The best growers in this area cultivate every week or ten days from the time the plants are set in the field until the vines are too large to permit cultivation. From four to eight cultivations on the average are given per season. As a rule shallow cultivation is practiced, although there is still too great a tendency to cultivate deep and thus injure the crop severely. Deep cultivation is usually the result of permitting the grass and other weeds to get a start.

Control Diseases in Plant Bed

Very few pest control measures are practiced in the field. It is generally felt that the most effective pest control measures should be practiced in the plant bed. The growers feel that by starting with good, strong, healthy, vigorous plants their assurance of a crop is sufficient without costly field control measures. Although in general the above is true, yet at times, field spraying or dusting is necessitated by attacks of the tomato worm and tomato aphis.

The entire area is wilt infested. The better growers are intelligently attacking this problem through crop rotation and resistant varieties.

For the most part, the fruit is harvested in five-eighths bushel baskets, and hauled to the canning factory by teams or trucks. The grower's responsibility ends at this point. Two distinct methods of sale are in vogue. Previous to the 1930 season, practically all raw fruit was purchased by the canner on a flat contract price. This price was largely determined by the average of the fruit delivered at the cannery. The grower of poor fruit received exactly the same price per bushel as the grower of high quality fruit. In 1930, however, three canners in the Northern Neck purchased their raw fruit on the basis of U. S. grades. So satisfactory were the results that an extension campaign was put on in cooperation with the State Division of Markets to persuade other canners and growers to adopt this practice.

Quality Fruit Makes Quality Pack

Some experiments were conducted which showed that the canner received on an average 12 more No. 2 cans of tomatoes from a bushel of U. S. No. 1 raw fruit than from a bushel of U. S. No. 2 raw fruit and approximately 13 more cans from a bushel of U. S. No. 2 raw fruit than from a bushel of culls. In addition, the quality of the canned pack increased as the quality of the fruit increased. This is an important consideration to the canner who must sell his pack under the Mapes Amendment. Thus, the canner was convinced that he could afford to pay a considerable premium for high quality fruit. The good grower likewise benefited. He received the price of good fruit. No longer was he penalized by the grower of common stuff. So completely sold were canners and growers that during the 1931 season 28 concerns at 36 different plants purchased their raw fruit on a grade basis. It is expected that practically all canners and growers in this area will transact their purchases and sales in this manner in the 1932 season.

The average yield for the State during the past four years has only been 2.7 tons or 90 bushels per acre. Two bad tomato years have been experienced in Virginia; 1930 was the drought year and in 1931 disease conditions were the worst in years. Some growers in the Northern Neck re-

ceive from 200 to 400 bushels per acre. Yields are constantly being increased through improvement in cultural practices. The use of better seed, more intelligent fertilization, adequate pest control measures, and the Mapes Amendment are factors which will have a tendency to increase the yield in this area appreciably within the next few years. The alert growers are paying considerable attention to all of these problems.

The Inquiring Mind

(*From page* 16)

enactment of favorable legislation on these subjects.

The improvement of conditions for the Iowa farmer was ever his aim, and he fought and won many a political battle in their behalf. He was popular among his colleagues as, not being bitterly partisan, he was acceptable to all parties. One editor wrote of him at the time he was made Speaker, "Iowa has few men of more worth, none of a better manliness, none more thoroughly representative of the people. He will prove a popular presiding officer." And so he did.

But "Tama Jim" was still to go up higher. He was a member of Congress from 1873 to 1877, and again from 1883 to 1885. From 1879 to 1884 he was a Regent of the Iowa State College, and he served as a member of the Iowa State Railroad Commission from 1877 to 1883. For a number of years he edited the *Traer Star Clipper*, in which paper his articles on farming attracted much attention. From 1890 to 1897 he was Professor of Agriculture in Iowa State College, and Director of the Experiment Station.

It is said that when Mr. Wilson went to the State College, at Ames, J. H. Shepperd, now President of North Dakota Agricultural College at Fargo, was the only agricultural student there; but with the assistance of Professors Curtiss and Kent an agricultural department was soon established. When Mr. Wilson went to the Legislature, he told just what he wanted in the way of appropriations for the College, and was granted his requests. Even after he went to Washington, he fought for appropriations from the State Legislature, to support the Ames institution. It was characteristic of him, through life, to decide definitely what he wanted to further his ends for the public good and then fight strenuously until he got what he asked for. His insistence that agriculture should be taught in the school was accounted his chief achievement while at Ames.

During his service from 1897 to 1913 as Secretary of Agriculture at Washington, he obtained for agriculture the recognition it deserved from the public and the legislators of the land. Through him the Nation came to understand the need for aid to the farming industry and gained confidence in technical investigational research to render such aid. He inculcated the idea of scientific farming, gave illustrations of it a spectacular interest, and impressed upon the people the power of an adequate Federal Department of Agriculture to benefit the farming industry and the home life and welfare of the farmer.

At the outset of his Secretaryship he stated the purpose of his Department, as follows: "The Department of Agriculture was organized to help farmers to a better knowledge of production and its tendencies at home and abroad, so as to enable them to intelligently meet the requirements of home and foreign markets for material that may be profitably grown or manufactured on American farms. It was also intended that the Department

should organize a comprehensive system of means by which the sciences that relate to agriculture should become familiar as household words among our farmers."

A Good Judge of Men

"Tama Jim" tackled his new duties with tremendous energy and enthusiasm. His brain teemed with great ideas and projects, most of which in time were successfully consummated. The 16 years of his administration as Secretary showed an unprecedented record of advance and accomplishment. His was a great directing and controlling influence. The necessity of applying science to bring his projects to pass did not baffle or overawe him. Being a good judge of men, he soon put the right man in his right place and then saw to it that he was adequately supplied with funds to carry on his research operations. One of his notable appointees was Mr. Gifford Pinchot, the present Governor of Pennsylvania, who developed his office in the Department into a great Bureau, which did magnificent work in the conservation of our national forests.

By sending an explorer to the Orient to find a variety of rice that would not shatter in the milling process, Secretary Wilson practically revolutionized the rice-growing industry of the South. He also benefited the people by introducing many new foreign varieties of grains, grasses, and useful and ornamental plants, by importing parasites that destroy noxious insects, and beneficial insects that successfully pollinate the fig orchards of California, and by stamping out a dangerous outbreak of contagious foot-and-mouth disease. Another of his most commendable acts was the abolition of the free distribution of seeds by Congressmen and the U. S. Department of Agriculture.

The Experiment Station Record of 1920 informs us that when Secretary Wilson came to the Department of Agriculture, the combined appropriation for its up-keep and transactions was approximately $3,250,000 of which close to $1,000,000 was for State experiment stations, the distribution of seeds, and for special publications ordered by Congress. By 1905, the appropriation had nearly doubled, and two years later it had quadrupled. In consequence of new functions, and the general expansion of the work under Secretary Wilson's direction, the appropriation had reached more than $20,000,000 in 1911, and in 1913, $24,743,044. The working force of the Department numbered less than 2,500 persons in 1907, and in his last year it was nearly 14,000.

The expansion of the working force of the Department was due, in part, to regulatory duties imposed by new laws and the management of the National Forests; but it represented a very large growth in the forces concerned with research and measures for the improvement of agricultural practice.

The printing funds for the Department's publications increased from $116,888 in 1897 to $470,000 at the end of Secretary Wilson's period of service. The number of publications issued was enlarged from a few more than 400 to more than 2,000 a year, and the aggregate edition from 6,500,000 copies to nearly 35,000,000. In 1897 the requests for publications barely exceeded 500 letters a week, while 16 years later such weekly applications averaged more than 52,000. This reflects the extension, under Secretary Wilson, of the Department's contacts with the farmers and other readers of the country.

Notable Growth and Achievement

Secretary Wilson found only the Weather Bureau and the Bureau of Animal Industry in operation when he assumed his duties in 1897. In addition, there were 10 subject matter divisions, and the Office of Experiment Stations. The plant industry work was divided among several independent

divisions, giving a lack of coherence in related lines of effort. Ultimately, these divisions were brought together in a large Bureau of Plant Industry, whose scope was rapidly expanded to meet advancing needs. Six of the other divisions were raised to the grade of Bureau as their lines became more numerous, and special laboratories, offices, and boards were provided to care for new features. Agricultural Extension was begun, under the name of the Farmers' Co-operative Demonstration Work, especially as a result of the boll-weevil and the necessity of more diversified farming in meeting its ravages. An insecticide and fungicide board, and a Federal horticultural board were organized, with laboratories and specialists to meet their needs.

The beet sugar industry in this country practically grew up during Secretary Wilson's administration. His Department also undertook the eradication of ticks which carry Texas fever infection to cattle of the Southern States, and succeeded wonderfully in the effort. The effective country-wide campaign for the eradication of bovine tuberculosis also was inaugurated during his administration, and great progress was made in the control of hog cholera by vaccination and sanitary methods.

The Adams Act, supplementing the original Federal appropriation to the State Experiment Stations, had the cordial support of the Department, and following its passage, Secretary Wilson secured the means necessary to put it into effect without delay. Secretary Wilson succeeded in having many buildings erected for the accommodation of the various Bureaus of his Department, and supplied laboratories and equipment for scientific research. The Arlington farm tract, of about 400 acres, was transferred to his Department from the War Department, in 1900, and was improved and developed as a field laboratory. Another farm was purchased and equipped for experiments in animal husbandry and dairying. The Secretary also interested his Department in the establishment of agricultural experiment stations in Alaska, Hawaii, Porto Rico, and Guam.

One of the most notable achievements of Secretary Wilson's administration was the passage of the Food and Drug Act and means for its enforcement. Then came the Meat Inspection Law of 1906, and its beneficent effects for the protection and welfare of the people of the country. Other important accomplishments were the act of 1905 for the suppression of contagious diseases of livestock through quarantine measures, the Plant Quarantine Act to prevent importation of disease or insect-infested nursery stock, and the Lacy Act regulating the importation of destructive animals and controlling commerce between the States in games taken in violation of State laws.

Championed Cause of Farm Women

Secretary Wilson likewise interested himself in creating a profitable foreign market for American butter, and another of his beneficial acts was the sending out of climate and crop reports to all parts of the country. His championship of the cause of the farm women of the land also won him their esteem and gratitude. Relative to this subject he said: "In the great work of helping the women of our land, nearly half of whom are toiling in the homes upon our farms, this Department, it is believed, has a large duty to perform. For whatever will be effective in raising the grade of home life on the farm, in securing the better nourishing of the farmer's family, and in surrounding them with the refinements and attractions of a well-ordered home, will powerfully contribute alike to the material prosperity of the country and the general welfare of the farmers." Later, he carried the idea much further, when he expressed the wish that the Department might extend its assistance to those "who are engaged in the

noble task of giving practical training to the future wives and mothers of our farmers, and to the vast army of faithful women who are bearing the heavy burdens of keeping the farmers' homes pure and sweet, and rearing the future masters of our vast agricultural domain."

Secretary Wilson's work in Washington was strenuous at all times; but he felt repaid for all of his labor and lived to see the complete fulfilment of his hopes and endeavors.

His final report closed with this sentence: "Men grow old in service and in years, and cease their labor, but the results of this labor and the children of their brains will live on; and may whatever of worth that is in these be everblooming."

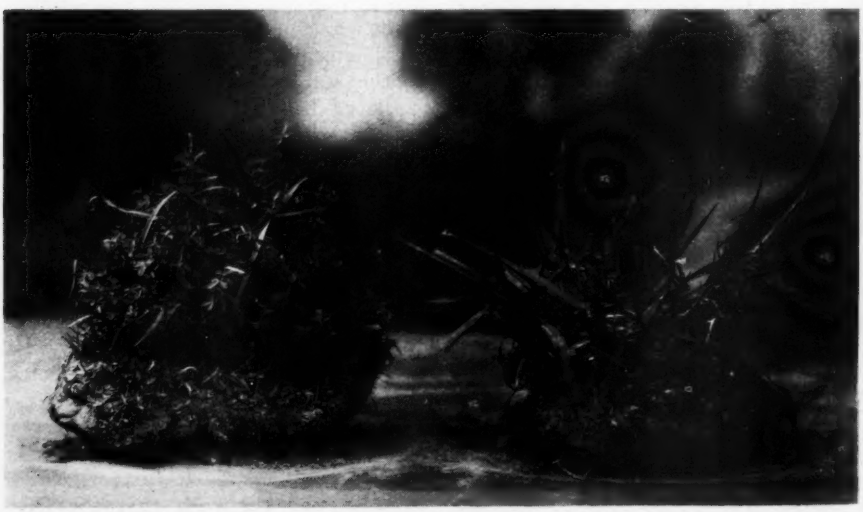
The "power of thought and the majesty of the mind" were the activating forces of James Wilson's life and deeds, and the fame and gratitude they earned for him will endure.

Fertilizing Lespedeza

(*From page* 17)

tion on three of the five plots. Where phosphate alone was used the lespedeza held its stand in competition with the Dallis grass and gave a fair growth. Where potash was added to the phosphate, the growth was decidedly better, about twice as high. One could tell which plot he was in without reading the signs. On the phosphate-potash plot his shoetops were hidden in lespedeza, which was not true of any other plot.

Where nitrogen was added to the phosphate-potash combination, Dallis grass jumped ahead and nearly killed out the lespedeza. This made a coarser pasturage, which was not grazed so heavily by the cows. This would indicate clearly that for a grass mixture of this type, the fertilizer used should be low in nitrogen and high in potash and phosphoric acid. In this field we used 1,000 pounds per acre of 0-10-10



Left: 1,000 lbs. 0-10-10 per A. Right: 1,000 lbs. 5-10-10 per A.
The growth of lespedeza on the left remained luxuriant, whereas on the plot receiving nitrogen in addition to phosphoric acid and potash, the Dallis grass ran out the lespedeza in 15 months.

Left: No fertilizer. **Right: 1,000 lbs. 0-10-10 per A.**

The grass from a square yard of the plot receiving no fertilizer was very coarse, while that from a square yard of the fertilized plot was much finer and more succulent.

mixture in the case of phosphate-potash plot and the same rate of 0-10-0 and 5-10-10 on the other plots.

The pictures show very strikingly what happened in 15 months after the stated applications of fertilizer were made. This farm is located near Yale, in Sussex county, Virginia, and is owned by Mr. J. M. Rogers.

Fertility

(*From page* 4)

for manure. Likewise there were terrific famines on impoverished farms. Again there were many guesses to correct this need, but no real remedies based on truth.

So even while land improvers chased the myth of phlogiston to "subterranean pastures," there were soils that "naturally" bore plentiful crops and others that were consistently barren and bleak.

And in 1932 while man improvers chase the mirage of artificial adjustment through legislative halls and commercial mazes, there are men who naturally produce treasures of hope and achievement, and others who consistently drift and droop.

But our doubt and inertia slows up the parade. Since the empirical days of soil experiment, during the past one hundred years in which the job of land control has outrun the science of man control, the agricultural world has tested and adopted the findings of many brilliant minds. Liebig, Lawes and Gilbert, Boussingalt, Lipman, Winogradsky, Thorne, and countless more savants have unlocked the facts in this greatest of mystery plots. Yet after critical scrutiny had accepted the findings, a long and painful road remained before the soil could benefit from this rain of science.

American farm land was divided among the ambitious and independent sons of men, each expressing his own idea of liberty by sticking to the custom of his fathers, with smug belief that each new generation could move westward to virgin furrows. If the old land played out, there was no use in fooling with it. Move on, and reap where the bison, the buffalo grass, and the red skin had enriched the land simply by living on it and leaving it alone.

At last expansion was mostly over and the farmer of the later age has found himself cornered on the old de-

pleted forty, where he has had to fight back with fertilizers.

In just the same manner have the theorists and philosophers with human welfare at heart met with stubborn, provincial, unreasonable resistance in trying to get beyond the phlogiston stage in the science of social economy.

But like the westward-faring farmers, opportunists have offered everything from expansion and invention to outright government subsidy to find a secure state for mankind in a troubled world. But the exploiters are finally in a corner too, and must turn to the laboratory, like those on the land when the plow no longer turned the virgin sod.

IDLE men and fallow land have certain parallels to ponder. Land is put to fallow in order to rest it or to kill noxious weeds. Land left unseeded agriculturally will soon sprout a mess of undesirable and menacing growth. Hence the farmer keeps up a regular cultivation of the soil during the term of its so-called idleness.

We sometimes think that our social crisis is met when we provide sustenance for idle men and yet make no provision for their stifled ambitions and pent-up energies. Careless breadline charity to man resembles the land which is left unsown and untilled. The value of both rapidly diminish, and the threat of evil and of weeds is carried abroad on every breeze.

Soil biology and psychology tell us that deep in the inner strata of land and men there are a violent turmoil and a pulsing life even when the surface seems bare and unfruitful. Out of the depths of the microscopic studies in soil organisms came the principle of nitrogen fixation and kindred valuable secrets. What are we doing to encourage more intensive research into the mental and spiritual reactions of man under the enforced environment in which his life is spent? Have we called for man analyses as generally as we have made soil tests?

No, on the contrary every time somebody with honest purpose tried to grope his way to a solution of this enigma, we turned his voice off the dial and chose instead the latest shrieking siren of jazzphony. Even some of us who have fully appreciated the arts of land improvement are among those who thought that every social economist was a crank.

The masters of the test tubes have afforded a mighty example to the world which is waiting for the sunrise, but too often they were themselves more engrossed with soil than soul.

Insurance of lives or perishable property has been a sound procedure for ages. The farmer can insure his silos and his sows, but he can't get a premium on a single acre by itself. The only form of land insurance lies in good tilth and rotation plus fertilizers. So the only way we have to insure the soil of a farm is closely wrapped in that oft-repeated saying of the provident Master Farmer: "to leave the land better for the coming generation while earning a living from it today."

WOULD that our philosophy of Americanism had as much promise for the "coming generation" as it contains for the soil which they hope to inherit. Humanity has plenty of insurance against death for the benefit of the survivors, but far too little insurance for the comfort and security of the living.

By this I do not mean more twenty-payment plans or term insurance policies locked in strong boxes, but well-planned national policies that will make panics and hunger forever unknown. Fortunately, the seed that will provide that harvest of happiness is even now sprouting, I believe, in the muck and humus of our present dilemma.

Balanced fertility not only does something good to the land but it has a marked effect on the yield, form,

and color of the plant and flower that rises refreshed from the soil cupboard.

It has been said of old that men are known by their fruits. But fruits of the best quality grow only from good stocks in good soil environment. The stocks of mankind are in process of production today. Hence by our human soil management systems, we not only control the formation of sound stocks, but we make the garden of life more colorful and richly satisfying.

WE use land to grow things. We are supposed to raise men for the inspiration or the example they may give to others, for the kindness they may do, or the joy their talents may provide. Land is not just so much silica, carbon, or sodium. Man is not just white or red or black.

Productive power of land depends upon the rate in which the soil elements to feed the plant are liberated. A merchant with a store of goods is successful according to the rapidity of his sales. Education and culture for men are most effective under conditions that afford ample chance to use them.

We often find men of limited knowledge exerting great power for good through their liberal and willing tendencies. It isn't the total stock of wisdom or fertility that one possesses that determines his usefulness. It's the desire to share with others what one may have of interest, love, and sympathy that makes the human harvest so bountiful and nutritious.

Soil fertility's chief goal is to yield new values. Land products are of value according to the nearness of markets and the density of consumers. Here is where so many proud and successful men, like bumper crops, must acknowledge that their worth and wealth depend solely upon the fact that they happen to grow close to a society that affords them an outlet for their powers.

This is more than usually evident in times of stress, when the fortunate ones must sense their obligation to the welfare of the society in which they prosper and become affluent.

Toxic influences often work insidious damage even on soils that give a high chemical test. The American standard of living, modern educational advantages, and general religious progress represent a high testing soil for us to use for the propagation of broader and better lives.

Yet on every hand we are forced to cope with slow and hidden poisons that discolor the roots of life and wilt the seedlings much faster than the raw blasts of adversity. America, with its high ideals, has tried to provide a suitable plant bed, but we have tolerated too many vicious irritants in our society.

Research and extension are to be called upon for man's relief, just as they were drafted to move soil science from the phlogiston stage to the present era of abundance that goes begging. Let's not delay the game any more by pedantic quarrels as to whether we need more new facts to teach or more missionaries to peddle ancient gospels.

Doubtless we need to know more about ourselves as starving plants in an eroded, alkaline land. But we also need to know why good seed on a rich acreage fails to meet justified hopes.

WE are face to face with a fertility that succeeds and a fertility that fails.

Knowing well that science always meets the challenge sooner or later, our belief is that man stands upon the threshold of a darkened room filled with comfort and opportunity. We are merely awaiting the incandescence of inspiration to give us the light we crave.

Taking the fertility we have and the faith we can muster, let us show the world that the ancient craft of husbandry holds true to its motto, "Carry on with courage!"

Remember, the weakest yield comes just before the application!

SAY IT WITH VIOLETS

"Buy a bunch of violets for your sweetheart, sir?" urged the flower seller.

"Haven't got one," replied the young man.

"Take a bunch home to your wife."

"Sorry, I'm not married."

" 'Ere—buy the bloomin' lot to celebrate your luck!" — *Epworth Herald.*

"Ah tells yuh, Mose, Ah done found out de diffunce 'tween de men and de women at las'."

"Say what yuh please, it's dis way. A man'll gib $2 foh a $1 thing dat he want, an' a woman'll gib $1 foh a $2 thing dat she don' want."

"Say, Hilda, that guy I saw you out with last night looked like a flat tire to me."

"Yeah, he was. I'm gonna use him for a spare from now on."

CAREFUL

Sandy, who owned a picture theatre in Aberdeen, went to London to get some new ideas for advertising. While in London he noticed a sign over a movie house which said: "All persons over 80 will be admitted free!"

"Just the thing!" he thought to himself.

After his return to Aberdeen he put this notice on his theater box office:

"All persons over 80 years of age will be admitted free—if accompanied by their parents."

SWEET MYSTERY OF LIFE

A careful driver approached a railroad crossing; he stopped, looked, and listened. All he heard was the car behind him crashing into his gas-tank.

—*Santa Fe.*

"Will you give ten cents to help the Old Ladies' Home?"

"What! Are they out again?"

Old Lady (to Tommy): "Surely your mother could find pieces of material more like your trousers when she patches them."

Tommy: "That ain't a patch; that's me."

She was an attractive young widow from New York. Sauntering out on the veranda of her hotel, she seated herself next to a handsome young man. She coughed slightly, but the stranger ignored her. She shot him a flirtatious glance that proved plainly she wanted to get acquainted, but he gave no answering sign. Finally a piece of dainty linen was wafted to the ground at his feet.

"Oh, I've dropped my handkerchief," she murmured softly.

The handsome youth turned a cold and unresponsive eye upon her.

"Madam," he said, "my weakness is liquor."

JUST PLAIN DOG

"My good man, does this dog possess a family tree?"

"Oh, no madam—he has no particular tree."

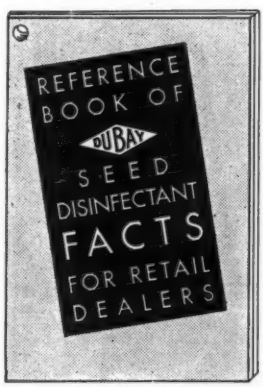
$14.83 PROFIT FROM 36 CENTS WORTH OF IMPROVED SEMESAN BEL

There are few sound farm practices that will return $14.83 on 36 cents cost for material. Yet this profit of $14.83 resulted from disinfection of seed potatoes with *Improved* Semesan Bel and at a cost of only 36 cents.

Thirty-five and four-tenths bushels of potatoes an acre was the average increase in yield secured in demonstrations with *Improved* Semesan Bel on practical farms in Maine, Minnesota, Ohio, Pennsylvania, and New York. This increased yield of 35.4 bushels priced at 42.9 cents a bushel—the December 1931 farm price—is worth $15.19; deduct the cost of treating, 20 bushels of seed per acre with Semesan Bel bought at the 25 pound rate, or 36 cents—and the profit is $14.83 per acre or 4117% return on the money spent for disinfectant. Such profits justify seed treatment as a regular farm practice.

To enable you to demonstrate seed potato treatment to your farmers, we will furnish any county agent or vocational agriculture instructor, upon request and without charge, sufficient *Improved* Semesan Bel to treat seed potatoes for 1 to 5 one-acre demonstration plots. All we ask of you is that you will see the growers plant treated and untreated seed and will report to you the results. Use the coupon below to request your Semesan Bel.

DU BAY BOOK OF FACTS



This profusely illustrated Du Bay Book of Facts contains a fund of valuable information on various crop diseases that are carried on the seed; how to prevent such diseases; the benefits of seed treatment on various crops; abstracts from a few of many Experiment Stations' reports in which Du Bay Products are mentioned; answers to commonly asked questions on seed treatment; descriptions of the various methods employed in applying seed treatment; methods of conducting simple demonstrations to show the benefits of seed treatment; gives reasons why seed treatment pays; and last but not the least in importance, a reproduction of the new Seed Treating Chart.

The Seed Treating Chart in pamphlet form is also available for your distribution to your farmers or students. This chart lists the surface-borne diseases of the principal crops and gives the fungicide, quantity and method of application for their control.

You can secure one Facts Booklet and as many Seed Treating Chart pamphlets as you need for class use by filling in the coupon and returning it to us.

Bayer-Semesan Company, 105 Hudson Street, New York, N. Y. **143-A**

I would like to demonstrate Improved Semesan Bel. Please send me sufficient material for ..... one-acre plots.

Also send me a Reference Book of Seed Disinfectant Facts ☐ Seed Treating Chart Pamphlet ☐

Name .....**Position** .....

City .....**State** .....

Sound Advice for the 1932 Cotton Grower:

PLANT COTTON on only as much good land as can be fertilized liberally with a high-grade mixture containing at least 8% potash. Put the remaining cotton land in food and feed crops and legumes.

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